MERCURY TMDLS FOR LITTLE RIVER AND CATAHOULA LAKE WATERSHED

SUBSEGMENTS 081601, 081602, 081603, and 081605

TMDL REPORT

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 6, DALLAS, TX
and the
Office of Environmental Assessment
Louisiana Department of Environmental Quality

Prepared by:

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FEBRUARY 2003

EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act (CWA) requires states to identify water bodies that are not meeting state water quality standards and to develop total maximum daily pollutant loads for those water bodies. A total maximum daily load (TMDL) is the amount of pollutant a water body can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be distributed or allocated to point sources and nonpoint sources discharging to the water body.

To meet this requirement of the CWA, the Louisiana Department of Environmental Quality (LDEQ) has scheduled completion of TMDLs in the Ouachita River Basin, in northeast Louisiana for 2002 and is relying on the EPA Region 6 to assist in the completion of some of these TMDLs. Little River from Bear Creek to Catahoula Lake (Subsegment 081602), located in the Ouachita River Basin, was placed on the list of impaired waters established as part of the 2002 Consent Decree and later modified LDEQ 1999 303(d) List due to elevated mercury concentrations in fish tissue. Subsequently, a fish consumption advisory for the Little River from Highway 500 near Georgetown to Catahoula Lake (58.25 miles), Catahoula Lake (18,797 acres), and the 11-mile reach of Little River (French Fork) from the lake to the dam near Archie was jointly issued by the Louisiana Department of Health and Hospitals (LDHH), the Louisiana Department of Environmental Quality (LDEQ), and the Louisiana Department of Wildlife & Fisheries (LDWF) on November 20, 2000. The study area includes subsegments 081601, 081602, 081603, 081605, 081606, 081607, 081608, 081609, 0816010, and 0816011. Potential mercury sources to the Little River from the upstream, contributing watersheds (Dugdemona River and Castor Creek) were evaluated due to the persistent nature of mercury in the environment; however, there are no current fish consumption advisories for these watersheds. Since atmospheric deposition is a known source of mercury, in addition to the study area, this TMDL report assesses potential mercury contributions from an airshed that extends a distance of 100 kilometers out from the Little River/Catahoula watershed.

While there have been no known violations of the numeric ambient water quality criterion for mercury, Little River, Catahoula Lake, and French Fork Little River do not meet the narrative water quality standard for toxic substances due to the fish advisory. The LDEQ narrative water quality standard for toxic substances states:

> "No substance shall be present in the waters of the state or the sediments underlying said waters in quantities that alone or in combination will be toxic to human, plant, or animal life or significantly increase health risks due to exposure to the substances or consumption of contaminated fish or other aquatic life."

The endpoint selected for these TMDLs is the methylmercury edible fish tissue concentration of 0.5 mg/kg, which is the basis of the fish consumption advisory. The benefits of using a fish tissue criterion include: (1) it accounts for spatial and temporal complexities that occur in aquatic systems; (2) it accounts for bioaccumulation and biomagnification in the aquatic food web; and (3) it is more closely tied to the goal of protecting public health from consumption of edible fish. An endpoint of 0.5 mg/kg methylmercury in fish tissue has been used previously in an approved mercury TMDL for another portion of the Ouachita River Basin in Louisiana (USEPA, 2002). As a numeric translator for this narrative standard, an endpoint of 0.5 mg/kg methylmercury in edible fish tissue has been selected as the target for these TMDLs.

All available fish tissue data, sediment and water data, air release and deposition data within the watershed and the airshed, point source discharge data, and geologic data were evaluated. Potential mercury sources to the Little River from the contributing watersheds and atmospheric components were calculated based on an annual mass balance approach. EPA's BASINS Version 3 was used to simulate watershed mercury loading to the Little River, Catahoula Lake, and their tributaries. Wet deposition rates were derived from the National Atmospheric Deposition Program Mercury Deposition Network data available for four Louisiana monitoring sites. Available data indicates that there are no natural sources of mercury in the geology throughout the watershed.

The calculated allowable load of mercury for the Little River/Catahoula Lake watershed is 111.38 lbs/yr. Because this assessment estimates 99.5 percent of the current mercury loadings to the Little River/Catahoula Lake watershed are from atmospheric deposition, 99.5 percent or 110.62 lbs/yr is assigned to the load allocation. The estimated current mercury load to the watershed is 164.76 lbs/yr. Therefore, this mercury load must be reduced by 53.38 lbs/yr (or 32.43 percent) to an allowable loading of 111.38 lbs/year. Since point sources are a relatively small portion of the total mercury load to the system, no reductions in point sources loads are required in this TMDL. The calculated load of 0.76 lbs/yr is established as the TMDL waste load allocation. Demonstrations that these assumed waste loads are met will provide reasonable assurances that the TMDL is achievable. Since conservative assumptions were used in the development of the TMDL calculations, the margin of safety (MOS) is implicit. The following table summarizes the TMDL calculations.

Table ES-1
Results

TMDL Calculations	
Current Estimated Loading	164.76 lbs/yr.
Waste Load Allocation	0.76 lbs/yr.
Load Allocation	110.62 lbs/yr.
Margin of Safety	0
TMDL	111.38 lbs/yr.

The TMDL authorizes re-allocation of the individual WLAs among point sources and indeed assumes that this will occur, but only to the extent that the sum of re-allocated loads remain at or below the sum of the original individual WLAs (sometimes described here as the cumulative WLA).

Since most of the current mercury loadings to the Little River/Catahoula Lake watershed are estimated to be from atmospheric deposition, significant reductions in atmospheric deposition within the airshed will be necessary to achieve the applicable endpoint of 0.5 mg/kg in fish tissue. Ongoing and future reductions in mercury emissions using a multimedia approach provide reasonable assurance that water quality standards will be attained. EPA and LDEQ have and will continue to take key steps nationally and regionally toward reducing mercury emissions and environmental and human health risks associated with mercury exposure. A combination of multiple state and federal programs will provide reasonable assurances that nonpoint sources of mercury can be reduced to levels necessary to meet the endpoint. The combined affect of these programs should translate to 50 percent reduction in annual emissions in Louisiana, which is greater than the 32 percent reduction required by these TMDLs.

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ACRONYMS AND ABBREVIATIONS

μg/L	Micrograms per liter
AMSA	Association of Metropolitan Sewerage Agencies
BASINS	Better Assessment Science Integrating Point and Nonpoint Sources
BAT	Best available technology
cfs	Cubic feet per second
CWA	Clean Water Act
DO	Dissolved oxygen
DOC	Dissolved organic carbon
EPCRA	Emergency Planning and Community Right-to-Know Act
FDA	Food and Drug Administration
FWQC	Federal Water Quality Coalition
GAP	Gap analysis program
GIS	Geographic information system
GP	General permit
Hg	Mercury
HgS	Cinnabar
HWC	Hazardous waste combustors
km	Kilometer
LA	Load allocation
LAC	Louisiana Administrative Code
LAG	Beginning of LPDES general permit numbering system
LAR	Beginning of LPDES multi-sector general permit numbering system for storm water discharges associated with industrial/construction activities
lbs/yr	Pounds per year
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LDWF	Louisiana Department of Fish and Wildlife
LPDES	Louisiana Pollutant Discharge Elimination System
MDN	Mercury Deposition Network
mg/kg	Milligram per kilogram
mg/L	Milligrams per liter
MOS	Margin of safety
MWC	Municipal waste combustors

MWI	Municipal waste incinerators
mya	Million years ago
NADP	National Atmospheric Deposition Program
ng/L	Nanograms per liter
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWR	National Wildlife Refuge
ONRW	Outstanding natural resource water
PBT	Persistent, bioaccumulataive, and toxic
PCS	USEPA Permit Compliance System
PLOAD	Pollutant load
ppm	Parts per million
QA/QC	Quality assurance/quality control
SIC	Standard industrial classification
TCEQ	Texas Commission on Environmental Quality
TEDI	Toxics emissions data inventory
TMDL	Total maximum daily load
tpy	Tons per year
TRI	Toxic release inventory
TSS	Total suspended solids
USEPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey
WLA	Wasteload allocation
WQS	Water quality standards
WWTP	Wastewater treatment plant

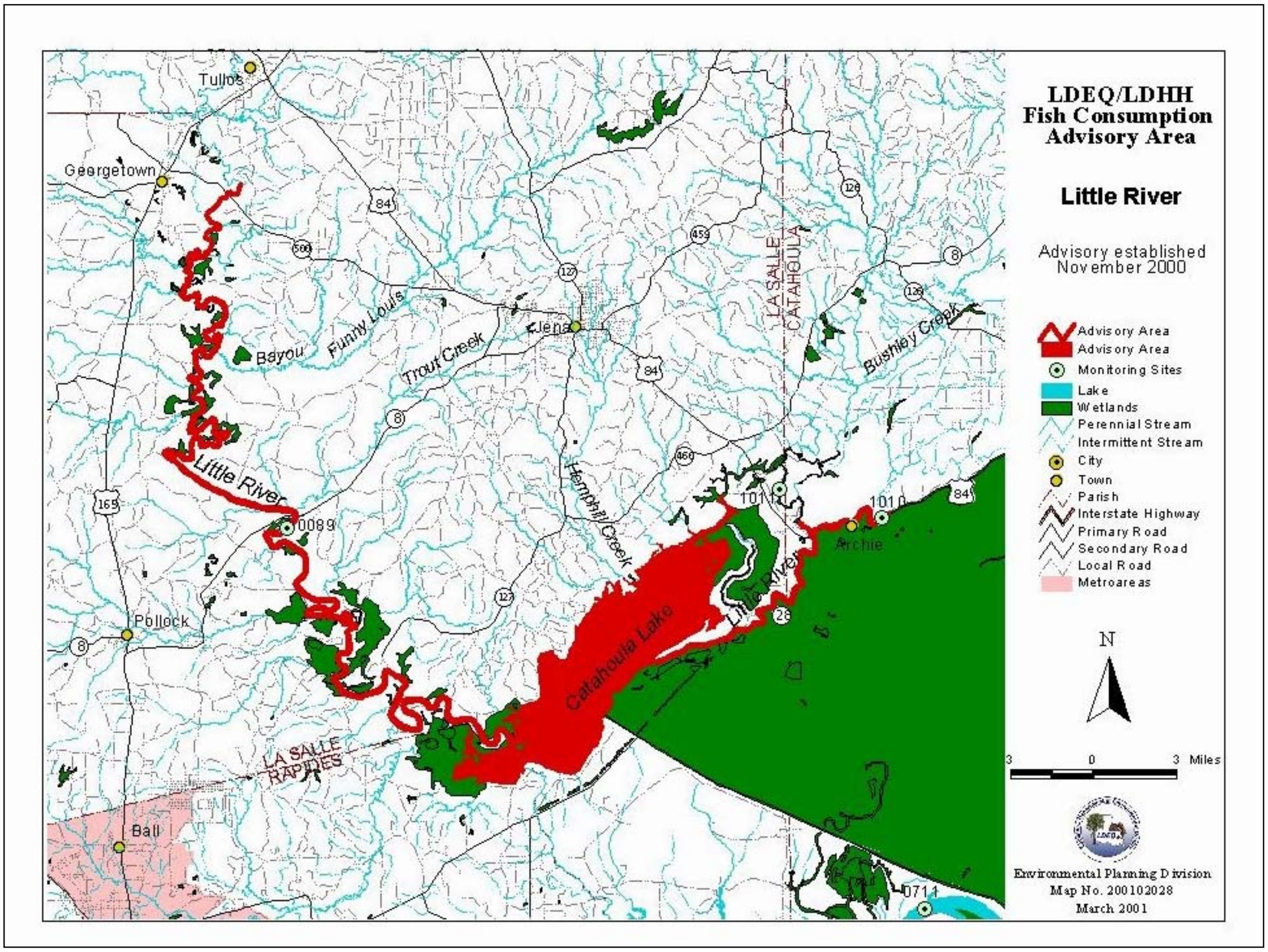
SECTION 1
INTRODUCTION

This report documents the data and assessment utilized to establish total maximum daily loads (TMDLs) for mercury for three waterbodies in Louisiana in accordance with the requirements of §303 of the Clean Water Act, Water Quality Planning and Management Regulations (40 CFR Part 130), and U.S. Environmental Protection Agency (USEPA) guidance. The purpose of a TMDL is to determine the pollutant loading a waterbody can assimilate without exceeding the water quality standard for that pollutant. The TMDL also establishes the pollutant load allocation necessary to meet the water quality standard established for a waterbody based on the relationship between pollutant sources and in-stream water quality conditions. The TMDL consists of a wasteload allocation (WLA), a load allocation (LA), and a margin of safety (MOS). The WLA is the fraction of the total pollutant load apportioned to point sources. The LA is the fraction of the total pollutant load apportioned to nonpoint sources. The MOS is a percentage of the TMDL that accounts for the uncertainty associated with the model assumptions and data inadequacies.

A fish consumption advisory for the Little River, including Catahoula Lake, was jointly issued by the Louisiana Department of Health and Hospitals (LDHH), the Louisiana Department of Environmental Quality (LDEQ), and the Louisiana Department of Wildlife & Fisheries (LDWF) on November 20, 2000. LDEQ's Mercury Monitoring Program revealed elevated mercury levels in fish at monitoring sites 0089 and 1010. Figure 1.1 shows these monitoring sites along with the fish consumption advisory area. As illustrated, the advisory includes the 58.25-mile segment of Little River from Highway 500 near Georgetown to Catahoula Lake (subsegments 081601, 081602), all of Catahoula Lake (subsegment 081603), and the 11-mile stretch of French Fork Little River from Catahoula Lake to the weir near Archie (subsegment 081605). To adequately address mercury sources contributing to the fish consumption advisory, this TMDL report also evaluates subsegments that are hydrologically connected to the Little River and Catahoula Lake. For the purposes of this TMDL report the Little River/Catahoula Lake watershed includes the following subsegments:

- 081601 – Little River, confluence of Castor Creek and Dugdemona River to Junction with Bear Creek
- 081602 – Little River, from Bear Creek to Catahoula Lake
- 081603 – Catahoula Lake
- 081605 – Little River, from Catahoula Lake to dam at Archie
- 081606 – Fish Creek, headwaters to Little River
- 081607 – Trout Creek, headwaters to Little River
- 081608 – Big Creek, headwaters to Little River
- 081609 – Hemphill Creek, headwaters to Catahoula Lake, including Hair Creek
- 081610 – Old River, Catahoula Lake to Little River
- 081611 – Bayou Funny Louis, headwaters to Little River

Figure 1.1 Fish Consumption Advisory Area



http://www.deq.state.la.us/surveillance/mercury/2000report/intro.htm

The USEPA recognizes that Dugdemona River (subsegment 0814) and Castor Creek (subsegment 0815), watersheds to the north of Little River, are considered tributaries of Little River (subsegments 081601, 081602). For the purposes of this TMDL report, however, Dugdemona River (subsegment 0814) and Castor Creek (subsegment 0815) are described as the contributing watershed (see Figure 2.2). It is important to note that there is no fish consumption advisory for these subsegments and that they were included in this assessment only to account for other potential mercury sources that may influence water quality in the Little River/Catahoula Lake watershed (See Section 5 for more detail). Water quality and fish data for subsegments 0814 and 0815 did not support including them on LDEQ's 303(d) list.

SECTION 2
STUDY AREA DESCRIPTION

These TMDLs for mercury have been developed to address the areas specified in the fish consumption advisory and as defined in the LDEQ 303(d) List. To adequately address mercury sources contributing to the fish consumption advisory, this TMDL report asses subsegments that are hydrologically connected to the Little River and Catahoula Lake (see Figure 2.1). The affected parishes include Grant, Rapides, La Salle, Catahoula, and Winn. Since atmospheric deposition is a known source of mercury, this TMDL report also assesses potential mercury contributions from an airshed that extends a distance of 100 kilometers out from the Little River/Catahoula watershed (see Figure 2.2).

2.1 OUACHITA RIVER BASIN

The headwaters of the Ouachita River are found in the Ouachita Mountains in west central Arkansas near the Oklahoma border. The Ouachita River flows south through northeastern Louisiana and joins the Tensas River to form the Black River, which empties into the Red River. The Ouachita River Basin (Basin 8) covers over 10,000 square miles of drainage area. Most of the basin consists of rich, alluvial plains cultivated in cotton and soybeans. The northwest corner of the basin is a commercially harvested pine forest (LDEQ 1996). The Little River/Catahoula Lake watershed is contained within the Ouachita River Basin.

2.2 LITTLE RIVER/CATAHOULA LAKE WATERSHED

Little River is formed by the confluence of the Dugdemona River and Castor Creek near the northeastern corner of Grant Parish, Louisiana. The Little River meanders to the south and east, forming the boundary between Grant and La Salle Parishes, before emptying into Catahoula Lake. Catahoula Lake is largely contained within La Salle Parish, although a small section of the lake extends westward into Rapides Parish. The French Fork Little River flows from the northeast portion of the lake and lies almost entirely within the Catahoula National Wildlife Refuge (NWR) and the Saline Wildlife Management Area. This reach of Little River seldom flows since flow is restricted to control the water level of Catahoula Lake for the purpose of waterfowl management. It only flows when the control structure at the Catahoula Lake Diversion Canal is opened to drain Catahoula Lake or when the Black River is flooding. When the lake is draining, water flows from French Fork Little River to Catahoula Lake. In addition, during flood conditions on the Black River, when the Black River backs up into Catahoula Lake, water flows from French Fork Little River over the dam at Archie (LDEQ 2000a).

Average annual precipitation in the study area, recorded at the nearest Louisiana climatic station in Alexandria-Estler, is 59.32 inches based on a 30-year period of record (1961-1990) (Louisiana State University 2000). The average annual rainfall amounts throughout the study

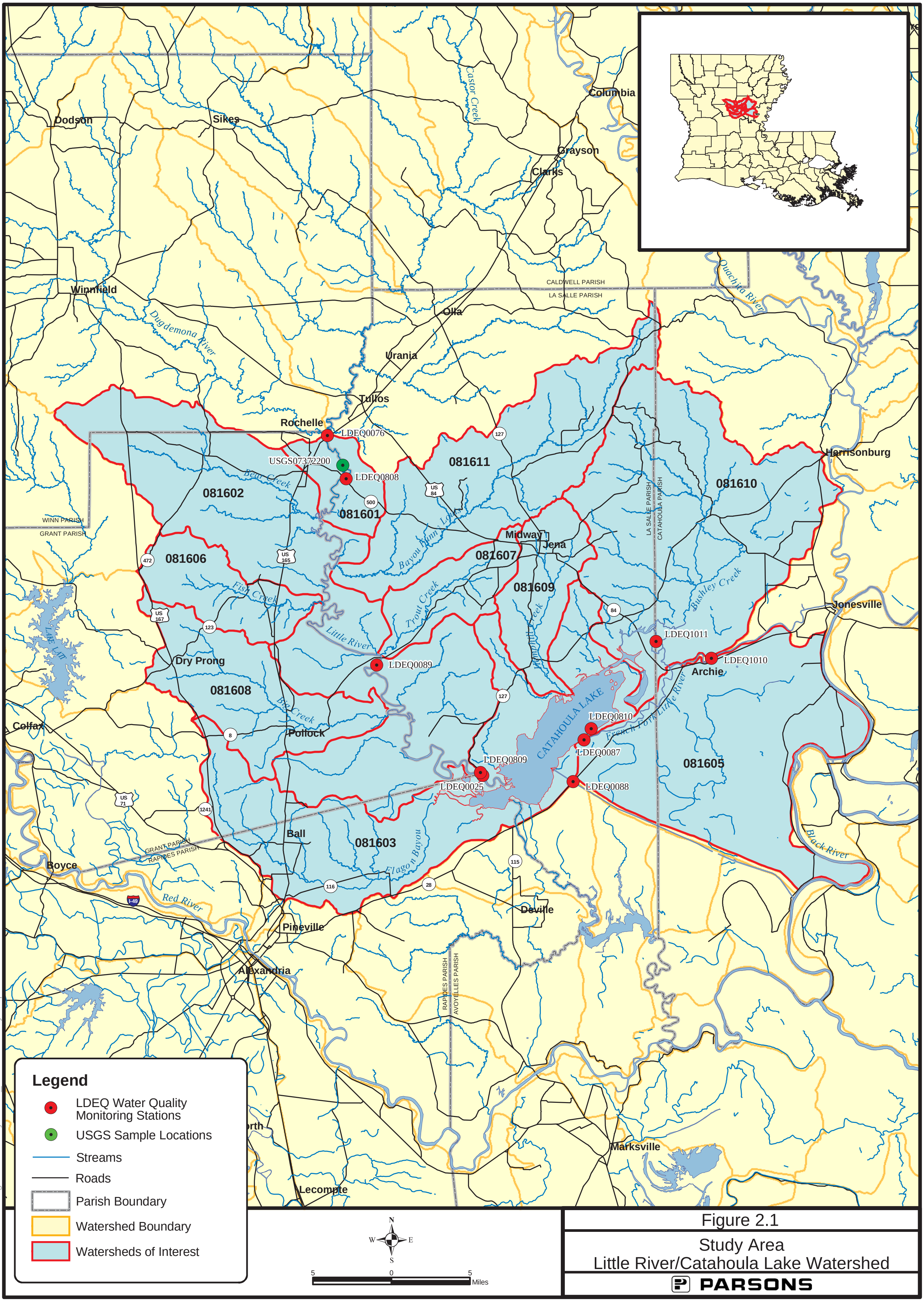


Figure 2.1

Study Area

Little River/Catahoula Lake Watershed

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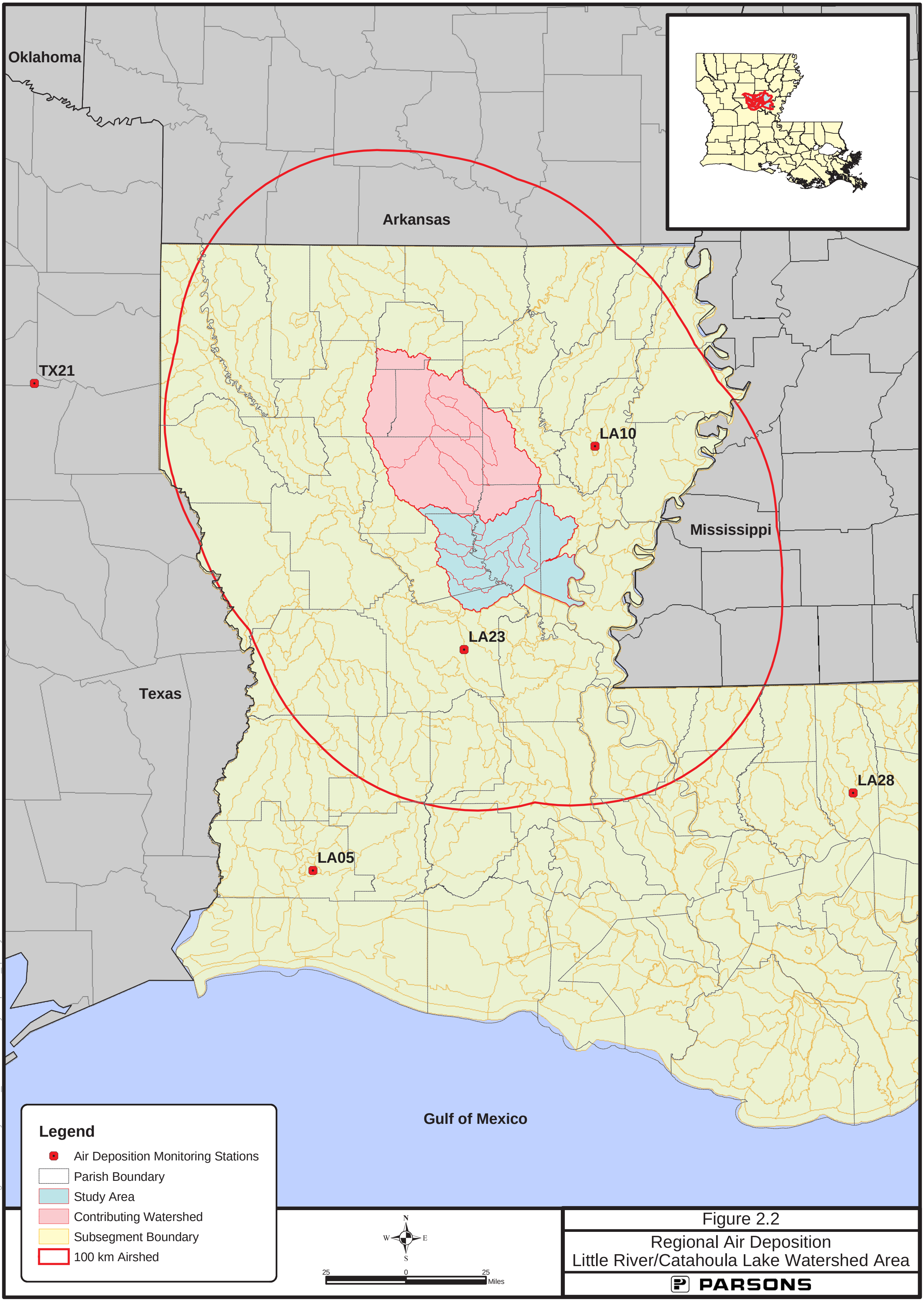

Figure 2.2
Regional Air Deposition
Little River/Catahoula Lake Watershed Area

area are shown in Figure 2.3. The annual average stream flow for Little River, as determined from U.S. Geological Survey (USGS) gauging station 07372200 near Rochelle, Louisiana (period of record from 1958-1991), is 2,286 cubic feet per second (cfs). The location of this gauge station is shown in Figure 2.1.

2.3 PHYSIOGRAPHY AND SOILS

The study area lies between, and is affected by, the valleys and flood plains of the Mississippi River and Red River. In this area there are three major physiographic divisions – alluvial valleys created from stream floodplains; "piney" hills of the Flatwoods area; and a small, topographically intermediate division of upland terraces found along stream valleys (Lytle and Sturgis 1962; Fisk 1938). Under current Natural Resources Conservation Service (NRCS) classifications, within and around the study area, these divisions can further be defined as soils of the Ouachita River Valley, Red River Valley, Southern Mississippi Valley, and Western Terraces and Uplands (NRCS 1998). Figure 2.4 depicts the NRCS soil types.

The soils found upland and outside of the Little River stream valley are those of the Western Pleistocene and Tertiary floodplains, terraces and uplands. These were previously identified as part of the Coastal Plain area (Lytle and Sturgis 1962). The soils are nearly level to gently sloping, comprised of grayish brown sandy loams at the surface, and underlain by sand clay loam subsoils. Typically the soils contain little organic matter and nutrients.

Within the Western Pleistocene and Tertiary divisions, soils near the headwaters of Little River were previously described as part of the general Flatwoods soil area. The materials are nearly level, poorly drained soils comprised of sands, clays, and silts derived from Pleistocene-age rocks (Lytle and Sturgis 1962). The soil is somewhat acidic and low in organics and nutrients. Because of the presence of siltpans, claypans, and high water levels, drainage is considered poor. Major uses are pine forest and some grazing.

Along the lower Little River and the western area of Catahoula Lake, the soils are within the Western Pleistocene floodplains and terraces (Recent Alluvium association). These soil types transition to Southern Mississippi Valley Alluvium to the north, east and south shores of Catahoula Lake as well as northeast along the French Fork of the Little River downstream to the Ouachita River. They are typically described as recent sediment deposits along streams and rivers. Their features include nearly level to gently sloping ridges (levees) along channels, backslopes, and basins/swamps. Soils of the Southern Mississippi Valley Alluvium within the Catahoula Lake area can be mixed older sediments from the Ouachita, Red River, and Mississippi floodplains. The soils vary from medium acidic, sandy loams along the natural levees, to acid or silty clays of the backslopes. As with other soils of the overall area, these soils tend to have low to medium acidity and low organics and nutrients (Lytle and Sturgis 1962). The extent of the soils are limited north and west by higher lands of the Mississippi valley escarpment trending northeast along and north of the lake, and southerly below the southeastern lakeshore (Fisk 1938).

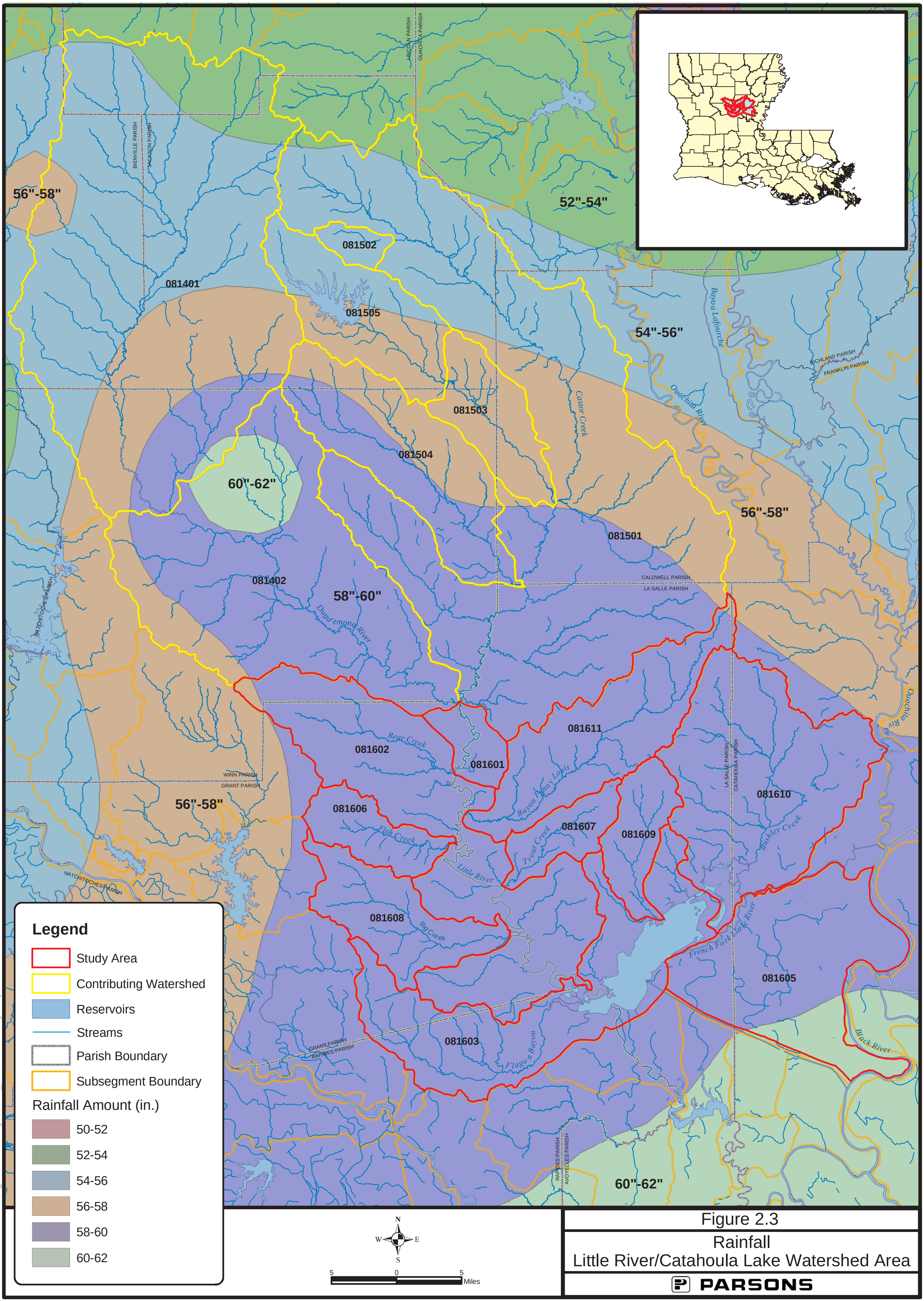

Figure 2.3
Rainfall
Little River/Catahoula Lake Watershed Area

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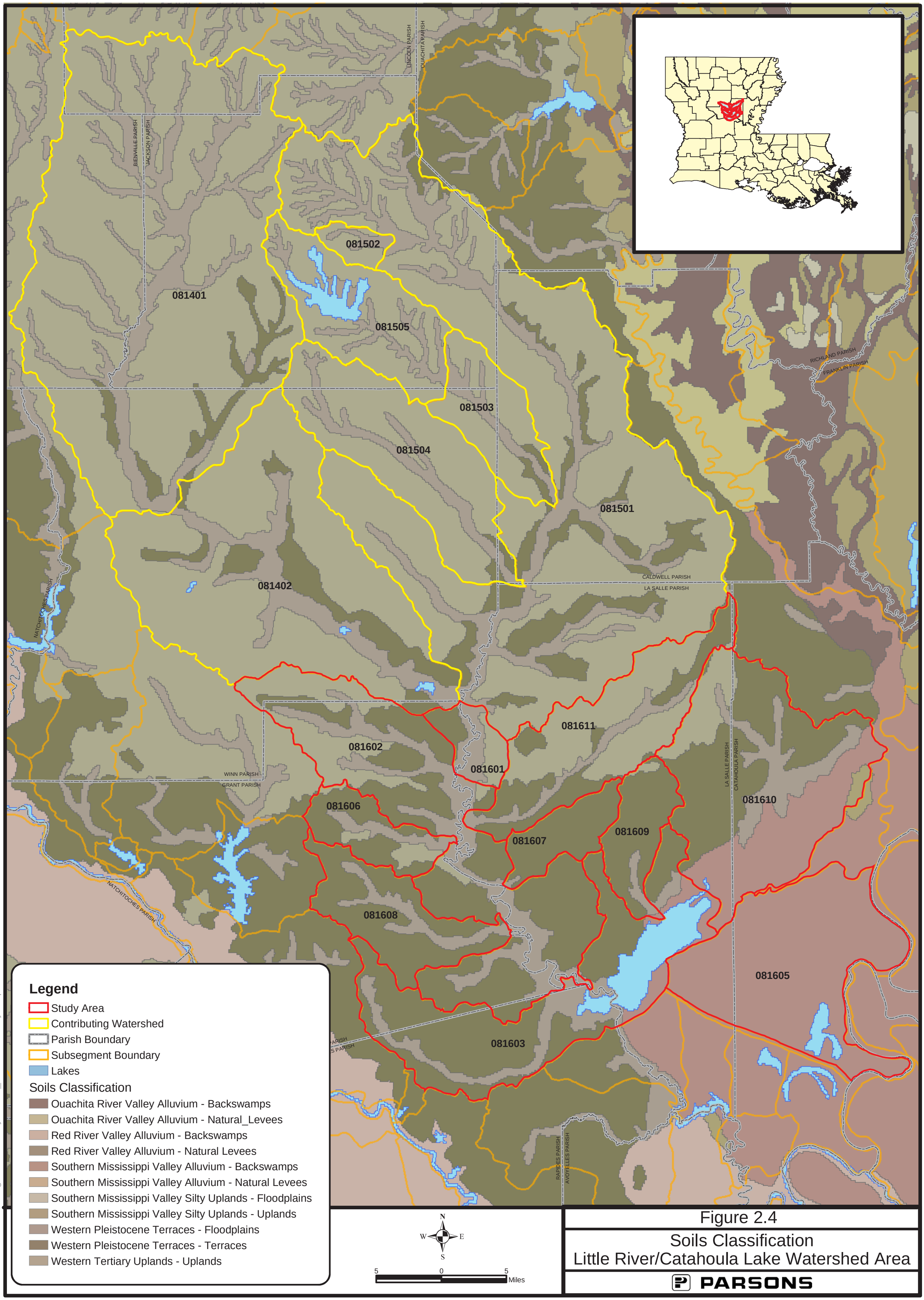

Figure 2.4
Soils Classification
Little River/Catahoula Lake Watershed Area
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2.4 GEOLOGY

Near surface rock strata of the study area have been estimated to be of Eocene to Holocene (54 to 38 million years ago-(mya)), or recent (from 11,000 years ago to present day) age, and reflect the depositional cycles of flooding and retreating of rivers in the region. In general, rocks closest to water bodies are the youngest, consisting of Quaternary alluvial valley deposits. Strata of the upland terraces within the study area are older and vary from sandstones to lignitic or fossiliferous clays. The following descriptions are summarized from the 1984 geologic map (Louisiana Geologic Survey 1984) with additional information from the publication on geology of Grant and La Salle Parishes (Fisk 1938).

Holocene-age alluvium is observed adjacent to Little River and its tributaries above Catahoula Lake, as well as most of the lake boundaries. The strata are described as gray to brownish gray clays and silty clays. The alluvium includes all the valley deposits with the exception of natural levees along the major river bodies. The latter is found along the lower reaches of Little River's French Fork that flows from Catahoula Lake northeasterly towards the Ouachita River. South of Catahoula Lake are Pleistocene-age braided stream terraces of tan and brown fine to coarse sand. These are considered glacial outwash of the ancestral Arkansas River, and are intermittently cut by younger alluvial river deposits as found along the Saline and Muddy Bayous.

Higher in elevation but within the stream valleys are Pleistocene-age Prairie Terraces. These deposits are light gray to light brown clays, sandy clays, silts, sands, and some gravels. These deposits are typical of stream valleys throughout the study area as well as southward to the Red River floodplain. Also found are occasional deposits of Intermediate and High Terraces that contain similar materials but are more dissected and topographically higher than Prairie Terraces. The three terrace types are separated by erosional unconformities.

Associated with a band of High Terrace deposits across central Louisiana trending east-northeast are Oligocene and Eocene strata, typically dated with fossils found in key strata. The Oligocene-age Catahoula Formation deposits are gray to white sandstones, quartz sand, volcanic ash, and brown sandy clays, with occasional petrified wood. Occurrences of the Catahoula are found along Fish Creek and a small tributary of Little River north of Fish Creek, as well as east of Little River along Bayou Funny Louis. Higher in elevation in the same east-northeast trending band are found rocks of the Oligocene Vicksburg Group (undifferentiated), described as lignitic clays with thin interbeds of lignite or micaceous sands, calcareous shale, some petrified wood, and local bluish fossiliferous clays.

Eocene-age rocks of the Jackson Group (undifferentiated) and older Cockfield Formation, separated by unconformities, are located along higher elevations away from the upper reaches of Little River and its tributaries. The Jackson Group includes lignitic clays with interbeds of limonitic sands, with calcareous and fossiliferous beds near the base of the group. Cockfield Formation deposits are brown lignitic clays, silts, and sands, with sideritic glauconite that can weather to ironstone in the lower part of the formation.

2.5 LAND USE

The study area covers approximately 853,585 acres of east central Louisiana. The land cover for each subsegment is shown in Table 2.1. These land use figures were derived from the USEPA BASINS Version 3 data sets which rely on USGS land use/land cover data. The aggregate land use in acres for the Little River/Catahoula Lake watershed is shown in Table 2.2. The study area is dominated by forest (60.06 percent) and agricultural land (20.10 percent). The Dugdemona River and Castor Creek watersheds consist of another 1,379,881 acres that are included in this assessment for the purposes of quantifying pollutant source loads from the contributing watershed north of the study area (see Section 5 and Appendix D). Figure 2.5 provides a map derived from USEPA BASINS Version 3 data sets that depict the different land use/land cover categories of the study area and the contributing watershed. Although there are a number of towns in the study area, most of them have populations less than 10,000 people. Urbanized or developed land uses comprise less than 2.5 percent of the study area, with residential and commercial land uses concentrated in the Catahoula Lake subsegment. Catahoula National Wildlife Refuge and Salina Wildlife Management Area border the northeast shoreline of Catahoula Lake.

Table 2.1 Land Use Summary for Each Subsegment (Acres)

Land Use	81601	81602	81603	81605	81606	81607	81608	81609	81610	81611
Agriculture	378	3,852	12,165	95,200	429	3,653	2,503	3,892	46,929	2,595
Forest Land	13,262	146,657	72,378	4,609	28,518	19,046	48,383	23,077	78,665	78,086
Orchards, Groves, Vineyards, Nurseries	0	0	174	0	0	93	2	0	0	0
Strip Mines, Quarries, and Gravel Pits	0	1,151	577	0	0	103	443	130	1,192	45
Transitional Areas	1,046	10,702	5,094	0	1,495	1,051	1,498	645	15,676	10,074
Urban or Built-Up Land	569	1,388	10,562	626	103	1,165	1,620	3,820	812	505
Water	69	546	18,044	1,971	0	0	37	0	1,587	0
Wetlands	2,928	18,371	20,663	19,951	473	257	1,348	230	8,693	1,779
Total Acres	18,252	182,667	139,657	122,357	31,018	25,368	55,834	31,794	153,554	93,084

Table 2.2 Aggregate Land Use Summary for Little River/Catahoula Lake Watershed

Land Use	Total Acres	Percent Total
Agriculture	171,596	20.10
Forest Land	512,681	60.06
Orchards, Groves, Vineyards, Nurseries	269	0.03
Strip Mines, Quarries, and Gravel Pits	3,641	0.43
Transitional Areas	47,281	5.54
Urban or Built-Up Land	21,170	2.48
Water	22,254	2.61
Wetlands	74,693	8.75
Total Acres	853,585	100.00

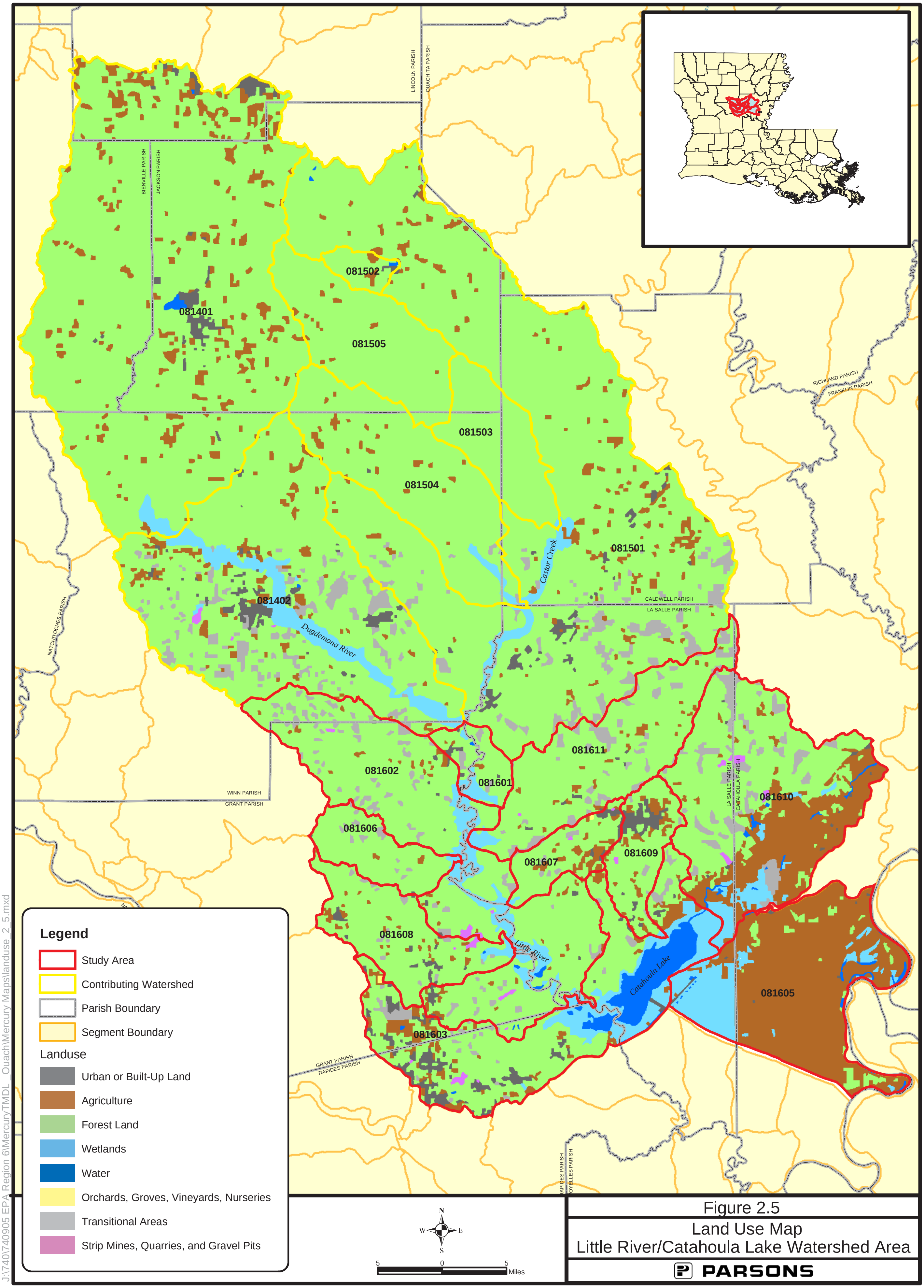

Figure 2.5
Land Use Map
Little River/Catahoula Lake Watershed Area

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SECTION 3
PROBLEM DEFINITION AND ENDPOINT IDENTIFICATION

3.1 PROBLEM DEFINITION

This TMDL report meets the provisions of the federal Clean Water Act (CWA) Section 303(d), which requires Louisiana Department of Environmental Quality (LDEQ) or the USEPA to develop a pollutant load allocation for each waterbody/pollutant combination identified on the list established as part of the 2002 Consent Decree (United States 2002). The list established in the Consent Decree and later modified (LDEQ 1999 303(d)) included mercury in fish tissue as a pollutant of concern in subsegment 081601, 081602, 081603, and 081605. The fish consumption advisory for the Little River from Highway 500 near Georgetown to Catahoula Lake (58.25 miles), Catahoula Lake (18,797 acres), and the 11-mile reach of Little River (French Fork) from the lake to the dam near Archie was jointly issued by the Louisiana Department of Health and Hospitals (LDHH), the LDEQ, and the Louisiana Department of Wildlife & Fisheries (LDWF) on November 20, 2000. While there have been no known violations of the numeric ambient water quality criterion for mercury, Little River, Catahoula Lake, and French Fork Little River do not meet the narrative water quality standard for toxic substances because of the fish consumption advisory.

The LDEQ narrative water quality standard for toxic substances states:

> *"No substance shall be present in the waters of the state or the sediments underlying said waters in quantities that alone or in combination will be toxic to human, plant, or animal life or significantly increase health risks due to exposure to the substances or consumption of contaminated fish or other aquatic life."*

The LDEQ and LDHH coordinate the assessment of health risks for the consumption of fish and jointly issue advisories if warranted. The LDWF and Louisiana Department of Agriculture and Forestry can also participate in the health risk assessment. When the average mercury concentration exceeds 0.5 parts per million (ppm) in fish or shellfish, a fish consumption advisory may be issued. Fish sampling conducted in October 1996, at monitoring site 0089 (Little River, upstream of Catahoula Lake, southwest of Jena), showed elevated mercury levels in fish tissue. Additional fish sampling at site 0089 was conducted in May 2000, with an overall average mercury concentration of 0.867 ppm (see Table 4.2). Fish sampling in June 2000 at monitoring site 1010 (Little River, downstream of Catahoula Lake, near Jonesville) also revealed elevated mercury levels, with an average mercury concentration of 0.512 ppm (see Table 4.2). Therefore, a precautionary fish consumption advisory for the area was issued by the LDEQ, LDHH, and LDWF for the Little River/Catahoula Lake watershed. The fish consumption advisory is provided in Appendix A. Based on this fish tissue data, the Little River/Catahoula Lake watershed exceeds LDEQ's narrative water quality criterion for toxic pollutants. This TMDL report has been developed to address the elevated levels of mercury in fish tissue for the LDEQ subsegments identified in the consumption advisory area.

3.2 LDEQ SURFACE WATER QUALITY STANDARDS

Water quality standards (WQS) for the State of Louisiana have been promulgated in the Louisiana Administrative Code (LAC), Title 33, Part IX (LDEQ 2002). The designated uses for the subsegments within the Little River/Catahoula Lake watershed are shown in Table 3.1. Designated uses for these subsegments include primary contact recreation, secondary contact recreation, and propagation of fish and wildlife. In addition to these designations, subsegments 081601, 081602, 081606, 081607, and 081608 are also recognized as outstanding natural resource waters (ONRW), which receive higher levels of protection under State water quality standards. ONRWs include water bodies designated for preservation, protection, reclamation, or enhancement of wilderness, aesthetic qualities, and ecological regimes, such as those designated under the Louisiana Natural and Scenic Rivers System or those designated by LDEQ as waters of ecological significance. No activity that would degrade ONRWs would be allowed, even if the activity were economically or socially needed by the region.

Table 3.1 Designated Uses for Little River/Catahoula Lake Watershed

Subsegment	Subsegment Description	Designated Uses
081601	Little River, Confluence of Castor Creek and Dugdemona River to junction with Bear Creek	A, B, C, G
081602	Little River, from Bear Creek to Catahoula Lake	A, B, C, G
081603	Catahoula Lake	A, B, C
081605	Little River from Catahoula Lake to dam at Archie	A, B, C
081606	Fish Creek headwaters to Little River (Scenic)	A, B, C, G
081607	Trout Creek headwaters to Little River (Scenic)	A, B, C, G
081608	Big Creek headwaters to Little River (Scenic)	A, B, C, D, G
081609	Hemphill Creek headwaters to Catahoula Lake	A, B, C
081610	Old River Catahoula Lake to Little River	A, B, C
081611	Bayou Funny Louis headwaters to Little River	A, B, C

A - Primary Contact Recreation; B - Secondary Contact Recreation; C – Propagation of Fish and Wildlife; D – Drinking Water Supply; G – Outstanding Natural Resource Waters

The applicable freshwater acute and chronic criteria for dissolved mercury are 2.04 micrograms per liter (µg/L) and 0.012 µg/L, respectively. Furthermore, if the 4-day average concentration for dissolved mercury exceeds the chronic criteria of 0.012 µg/L more than once in a 3-year period, the edible portion of aquatic species of concern must be analyzed to determine whether the concentration of methylmercury exceeds the Food and Drug Administration (FDA) action level of 1.0 mg/kg. LDEQ must notify USEPA if the action level is exceeded and take appropriate action such as issuance of a fish consumption advisory (LAC 33:IX.1113.C.6). In order for the waterbodies in the fish consumption advisory area to meet the designated use designed to protect human health, the narrative criteria for toxic substances must be met.

3.3 ENDPOINT IDENTIFICATION

40 CFR§130.7(c)(1) states that "TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical water quality standard." In certain circumstances, such as with fish consumption advisories, it is possible that numeric water quality criteria can be met, and the designated use still not be met. Since the primary objective of a TMDL is to restore and maintain the designated uses of impaired waterbodies, an endpoint or target must be established to determine if this goal has been attained. In the case of these TMDLs for mercury, restoring and maintaining the "fishable" use and protection of human health represent the water quality goals to be achieved by implementing the pollutant load allocations defined in this report.

An endpoint for mercury can be established as a water numeric criterion, a sediment concentration, or a fish tissue value. There are no documented exceedances of the dissolved mercury water quality criteria in the fish consumption advisory area, yet fish tissue concentrations are elevated. This phenomenon is described in more detail in Section 5. Thus, a dissolved mercury numeric water quality criterion would not provide an adequate endpoint for these TMDLs. In addition, sediment concentration data in the fish consumption advisory area are limited and correlations with fish tissue concentrations cannot be developed. Thus, sediment concentration is not a good endpoint for these TMDLs.

When the edible fish tissue methylmercury concentration exceeds 1.0 mg/kg, LDEQ and LDHH will recommend a limited consumption advisory for certain fish species and/or no consumption advisory for other fish species for pregnant or breast feeding women and children under the age of 7, and limited consumption for the general population. In addition, the LDEQ and LDHH will consider issuing a limited consumption advisory for pregnant or breast feeding women and children under the age of 7 when the edible fish tissue methylmercury concentration exceeds 0.5 mg/kg.

Since the LDEQ WQSs do not include a numeric water quality criterion for mercury explicitly calculated to protect human health, it is necessary to use the narrative criterion for toxic substances provided above on page 3-1 as the basis for setting the water quality target for these TMDLs. The best endpoint for establishing a TMDL is the methylmercury fish tissue concentration of 0.5 mg/kg, which is the basis of the fish consumption advisory. The benefits of using a fish tissue criterion include: (1) it accounts for spatial and temporal complexities that occur in aquatic systems; (2) it accounts for bioaccumulation and biomagnification in the aquatic food chain; and (3) it is more directly tied to the goal of protecting public health from consumption of edible fish. An endpoint of 0.5 mg/kg methylmercury in fish tissue has been used previously in an approved mercury TMDL for another portion of the Ouachita River Basin in Louisiana (USEPA 2002). As a numeric translator for this narrative standard, an endpoint of 0.5 mg/kg methylmercury in fish tissue has been selected as the target for these TMDLs.

While the USEPA has published a new human health criterion for methylmercury in fish tissue of 0.3 mg/kg (USEPA 2001), it is not used as an endpoint for these TMDLs since it has not been adopted in the LDEQ WQSs. LDEQ should review the basis of this criterion, including risk management assumptions for fish consumption rates, reference dose, and body weight, and evaluate the appropriateness of revising the existing methylmercury criterion during the next triennial revision of the state water quality standards.

SECTION 4
DATA ASSESSMENT

Data relevant to the study area for this assessment were obtained from a variety of sources, including but not limited to LDEQ, USEPA, Texas Commission on Environmental Quality (TCEQ), LDHH, NRCS, FDA, USGS, and the National Atmospheric Deposition Program (NADP). This section summarizes available data for mercury concentrations in ambient water, sediment, fish tissue, and the atmosphere.

4.1 AMBIENT WATER DATA

As part of the statewide ambient water quality network, mercury concentrations are monitored throughout Louisiana, including 14 monitoring sites within the Little River/Catahoula Lake watershed. These routine monitoring data are available at http://www.deq.state.la.us/surveillance/wqdata/wqdata.aspx. However, since ultra-clean sampling procedures were not followed by this monitoring program, the mercury data available from the LDEQ ambient water quality network are not considered in this TMDL study.

The LDEQ has sampled mercury in ambient water using clean techniques. Table 4.1 shows the dissolved mercury concentrations at site 0089, located in Little River southwest of Jena. These limited data, compared to the Louisiana freshwater chronic criterion for dissolved mercury, which is 12 ng/L, indicate that WQSs for dissolved mercury in ambient water are being met.

Table 4.1 Dissolved Mercury in Ambient Water at Site 0089

Date Collected	Hg (ng/L)
10/4/2000	0.72
11/14/2000	1.22
1/10/2001	10.80
2/13/2001	8.50
3/21/2001	10.60

(Source: LDEQ, Environmental Planning Division)

4.2 FISH TISSUE DATA

To assess the extent of mercury contamination in Louisiana, an extensive state-wide mercury study was started in 1994. Sampling mercury in fish tissue has been an integral part of this study. As of October 2002, fish were collected and sampled at a total of 428 sites. Complete results from the fish sampling are available online at http://www.deq.state.la.us/surveillance/mercury/mercraw.htm. Fish were collected using an electroshocking rig, nets, hook and line, or traps as described in LDEQ's *Quality Control Manual For Biosurveys and Fish Community Assessments* (LDEQ 1991). Target species included largemouth bass, channel catfish, blue catfish, crappie (*Pomoxis annularis* and *P. nigromaculatus*), and bowfin (*Amia calva*). If these target species were not found, other appropriate species such as freshwater drum (*Aplodinotus grunniens*), garfish (*Lepisosteus sp.*), striped bass (*Morone saxatilis*), white bass (*M. chrysops*) and buffalo (*Ictiobus sp.*) were collected. Composite fish samples consisted of skinless fillets from three to ten individuals of the same species and size class to make a total sample weight of at least 250 grams. Larger fish were analyzed individually.

There are four sample sites located in the Little River/Catahoula Lake watershed. Table 4.2 is a summary of the average mercury concentrations found in each species sampled at these sites from 1996 through 2001. A complete listing of the sampling results is included in Appendix B. These data show that the average fish tissue concentrations of mercury exceed the endpoint of 0.5 mg/kg at all four sites.

Table 4.2 Average Mercury in Fish Tissue (mg/kg Wet Weight)

Site	Site Description	Fish Species	Average Concentration (ppm)	Overall Average Concentration (ppm)
0089	Little River southwest of Jena, LA Subsegment 081602	Black Crappie	0.359	0.867
		Bluegill Sunfish	0.077	
		Bowfin	1.731	
		Channel Catfish	0.289	
		Largemouth Bass	1.336	
		Smallmouth Buffalo	0.516	
		White Crappie	0.576	
0810	Catahoula Lake east of Big Point Subsegment 081603	Blue Catfish	0.454	0.669
		Channel Catfish	0.270	
		Freshwater Drum	0.664	
		Largemouth Bass	0.742	
		White Bass	1.470	
		White Crappie	0.338	
1010	Little River near Jonesville, LA Subsegment 081605	Blue Catfish	0.385	0.512
		Flathead Catfish	0.718	
		Freshwater Drum	0.774	
		Largemouth Bass	0.601	
		Smallmouth Buffalo	0.296	
		White Bass	0.617	
		White Crappie	0.266	
1011	Old River northwest of Archie, LA Subsegment 081610	Flathead Catfish	1.071	0.911
		Freshwater Drum	1.072	
		Largemouth Buffalo	1.105	
		White Crappie	0.451	

4.3 SEDIMENT DATA

Table 4.3 includes all the mercury sediment data available from LDEQ for the subsegments within the fish consumption advisory area. The average of this sediment data is 0.06 mg/kg which corresponds to about a 30th percentile of all sediment data for the state. That is, 70 percent of the sediment values statewide were greater than 0.06 mg/kg. This information may be considered as baseline data for comparison to mercury sediment concentrations measured in the future.

Table 4.3 Mercury in Sediments

Site	Description	Subsegment	Sample Date	Total Mercury (mg/kg)
1001	Bushley Bayou South southwest of Harrisonburg, LA	081610	2/29/2000	0.038
			10/10/2000	0.012
1011	Old River northwest of Archie, LA	081610	5/30/2000	0.06
0810	Catahoula Lake east of Big Point, LA	081603	5/17/2001	0.079
0089	Little River southwest of Jena, LA	081602	10/8/1996	0.153
			5/16/2000	0.024

4.4 ATMOSPHERIC DEPOSITION DATA

There are four ambient air monitoring stations in Louisiana that are part of the National Atmospheric Deposition Program (NADP) Mercury Deposition Network (MDN). The locations of the stations are depicted in Figure 2.2. Weekly results of mercury concentrations in air and mercury wet deposition are available for each station. Weekly data are available at http://nadpdata/sws.uiuc.edu.

Table 4.4 is a summary of the average annual mercury concentrations in precipitation for each station, and Figure 4.1 shows the average annual concentration for each station.

Table 4.4 Average Mercury Concentrations (ng/L)

Year	NADP Monitoring Station			
	LA05	LA10	LA23	LA28
1998	10.133	8.264	---	10.070
1999	16.644	15.503	---	17.863
2000	19.320	15.706	---	15.805
2001	11.411	21.351	10.456	12.370

Source: http://nadp.sws.uiuc.edu

Figure 4.1 Average Mercury Concentration

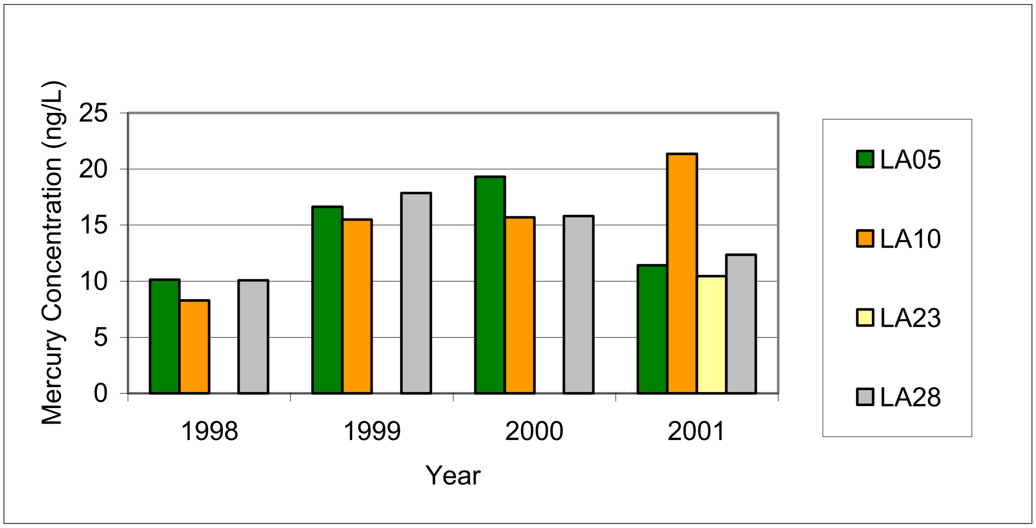


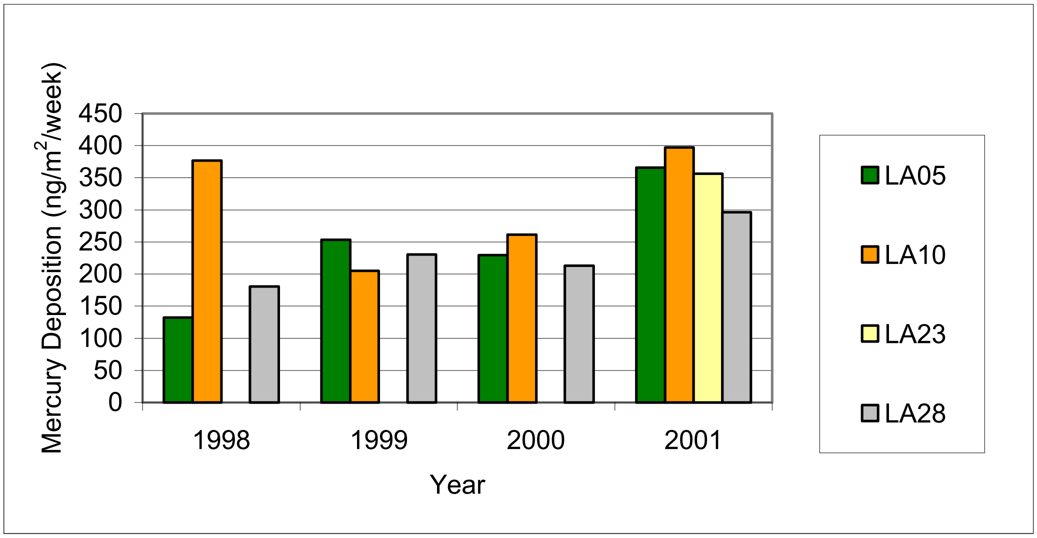
Table 4.5 is a summary of the average mercury wet deposition for each station by year, and Figure 4.2 shows the average wet deposition for each station graphically.

Table 4.5 Average Mercury Deposition (ng/m^2/week)

Year	NADP Monitoring Station			
	LA05	LA10	LA23	LA28
1998	132.445	376.908	---	180.831
1999	253.376	204.935	---	230.565
2000	229.552	261.488	---	213.212
2001	365.695	396.902	356.440	296.138

Source: http://nadp.sws.uiuc.edu/nadpdata/mdnreport98.asp

Figure 4.2 Average Mercury Deposition



These state-specific atmospheric mercury data are used to predict mercury loads in the study area and contributing watershed as discussed in Section 5.5. While mercury concentration and deposition data are fairly consistent throughout the state, there are some differences between stations. As a result, data have been weighted by the distance of each station from the center point of the watershed for purposes of calculating mercury watershed loading. Thus, mercury data from the stations located closest to the watershed are weighted more heavily.

Releases of toxic substances, including mercury, must be reported annually to the USEPA as part of the Toxic Release Inventory (TRI) program required by Title III of the Emergency Planning and Community Right to Know Act (EPCRA). Facilities must report releases to the air, water, and land annually. Releases of air toxins, including mercury, must be reported annually to LDEQ as part of the Toxics Emission Data Inventory (TEDI) as required by LDEQ regulations. The TEDI includes more facilities since all major sources are required to report emissions, not just facilities covered by Standard Industrial Classification (SIC) codes 20 –39 as required under the TRI program. There are differences in the emissions reported under TRI and TEDI since the reporting thresholds are not the same. Table 4.6 includes mercury air emissions data by SIC code for Louisiana. Statewide 2000 TRI and 2001 TEDI data show air emissions of 1,418 pounds per year (lbs/yr) and 1,554 lbs/yr, respectively. A summary of the mercury air emissions in Louisiana, as reported in TEDI, is provided in Appendix C.1 and Appendix C.2.

Table 4.6 Louisiana Air Emissions Data

SIC	Industry Type	2000 TRI (lbs/yr)	2001 TEDI (lbs/yr)
24	Lumber/Wood	NR	3
26	Paper	91	270
28	Chemicals	1306	1259
29	Petroleum Refining	11	22
32	Stone/Clay/Glass/Concrete	10	NR
Total		1418	1554

NR = None Reported

SECTION 5
IDENTIFICATION OF POLLUTANT SOURCES

5.1 MERCURY CYCLE

Mercury is a highly volatile element emitted and cycled in the environment through naturally-occurring and anthropogenic processes. Although there are many potential sources, the greatest anthropogenic source of mercury in water appears to be emissions from coal fired electric plants. Natural sources of mercury contamination include volcanic activity. Mercury released into the air can travel long distances and then be deposited into streams and lakes through atmospheric deposition (fall-out), making it nearly impossible to pinpoint sources of contamination. Mercury is also released into water and air by some industrial processes, waste incineration, and improper disposal of mercury-containing products (http://www.deq.state.la.us/surveillance/mercury/mercury_faqs.htm).

Figure 5.1 illustrates the transformation and movement of mercury in atmospheric, soil and aqueous systems. Mercury exists in the environment in different forms: Hg(0) (elemental), Hg(II) (inorganic), and CH_3Hg (organic). In the atmosphere, mercury exists almost entirely in the relatively insoluble gaseous Hg(0) state which can be transported over long distances from the source. Elemental Hg(0) can be converted in the atmosphere to the more soluble inorganic form that can be readily deposited to land or water. Wet and dry deposition is the mechanism by which mercury emitted into the atmosphere is transported to land and surface water. In surface waters, methylation of mercury can occur where inorganic Hg (II) binds to sediment or suspended solids and is transformed into methylmercury. Methylmercury is mercury that has been converted by bacteria or other processes into an organic (containing carbon) compound, CH_3Hg. Methylmercury is the only form of mercury that can be readily bioaccumulated by fish, humans, and other organisms; therefore, essentially all mercury found in fish is methylmercury.

This mobilization of mercury through aquatic systems is shown in Figure 5.2. For humans and wildlife, the mercury exposure pathway of particular concern is consumption of fish tissue with elevated levels of methylmercury.

Figure 5.1 The Mercury Cycle

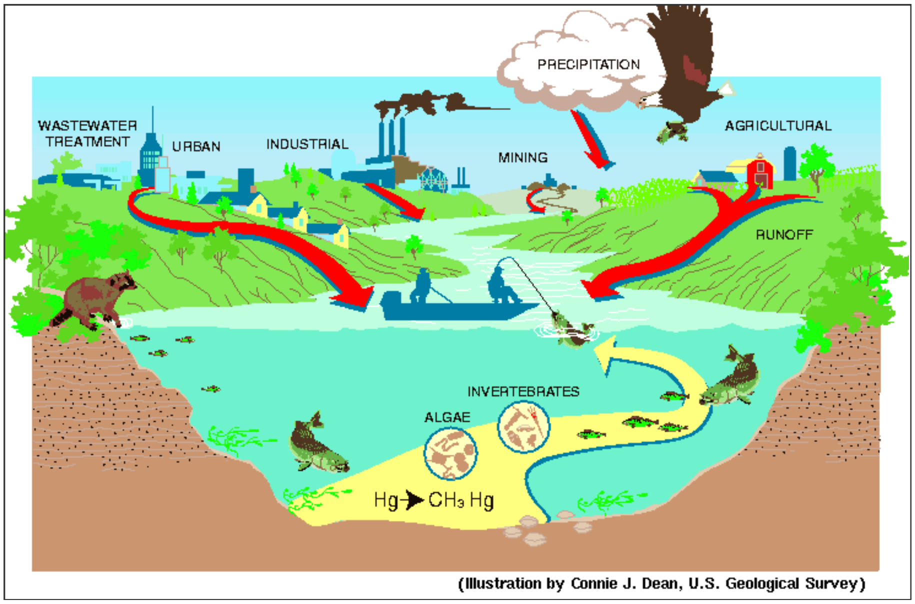
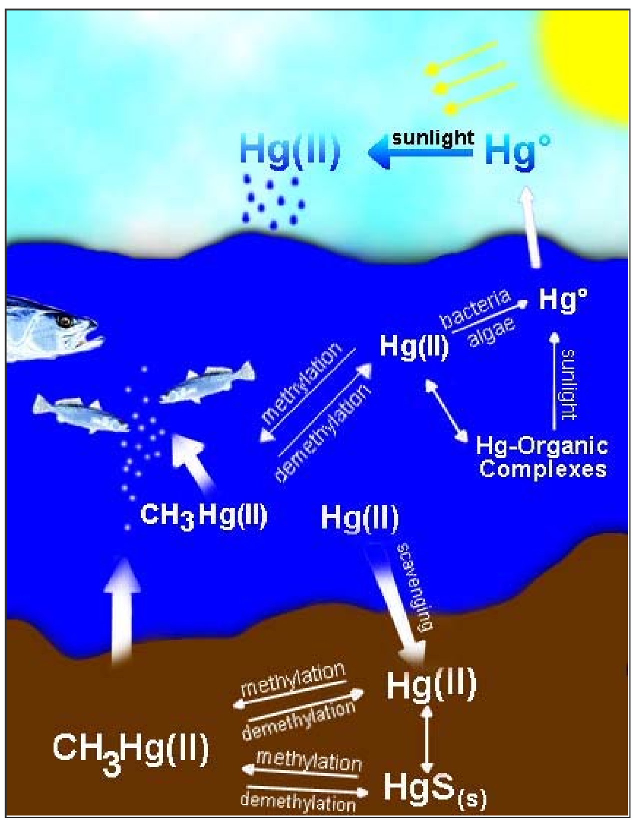


Figure 5.2 Pathways for Mercury Through the Aquatic Ecosystem



http://loer.tamug.tamu.edu/Research/Mercury/mercury.htm

5.2 METHYLMERCURY FORMATION

Studies have shown that local geochemical differences in water bodies can affect methylation rates and ultimately mercury bioaccumulation in fish. Several factors that influence methylation include low pH, high dissolved organic carbon (DOC) and low dissolved oxygen (DO). Physical and chemical characteristics of the watershed, such as soil type and erosion, and fluctuating water levels can also affect the amount of mercury transported from soils to water bodies (USEPA 1997).

Low pH has been shown to correlate with increased methylmercury. Piscivorous fish in waters with low pH (≤6.7) often contain mercury concentrations in fish muscle in the range of 0.5-2.0 ppm (USEPA 1995). This correlation is evident in lakes far from anthropogenic sources of mercury in which mercury in the fish is likely derived from the atmosphere. In such remote lakes, the greater accumulation of methylmercury in fish in low pH waters has been attributed in part to greater in-lake microbial production of methylmercury. In 1997, fish from 13 water bodies located in East Texas were collected to determine the relationships between mercury concentrations in fish and physicochemical variables in water and sediment. The results of the East Texas study found that a pH less than 5.7 in water alone accounted for 51 percent of the variation in expected mercury concentrations in largemouth bass (TNRCC 2000). Several monitoring stations within the Little River/Catahoula Lake watershed have a pH less than 6.7, making these waterbodies vulnerable to methylation of mercury.

In 1991, the Wisconsin Department of Natural Resources began the Wisconsin Background Trace Metals Study, during which strict adherence to the trace metal clean techniques were followed. Results of the study show that partitioning and speciation of mercury in Wisconsin rivers is strongly influenced by land use and land cover characteristics of the watershed. Highest total mercury and methylmercury yields were observed from sites that passed through wetlands (USEPA 1995). It is believed that mercury is complexed and transported in the dissolved phase with DOC. High levels of DOC in both surface waters and pore waters is a characteristic of wetlands. Wetlands are a significant component of land uses in the Little River/Catahoula Lake watershed. As shown in Table 2.2, wetlands comprise approximately 9 percent of the total watershed. As can be seen from Figures 1.1 and 2.5, wetlands are situated along Little River for the majority of its length from Highway 500 to Catahoula Lake. The Catahoula National Wildlife Refuge (NWR) borders the northeast shoreline of Catahoula Lake and is recognized as a Wetland of International Importance.

Low DO and fluctuating water levels have been found to influence production of methylmercury (TNRCC 2000). As described in Section 2, subsegment 081605, the reach of Little River from Catahoula Lake to the dam Archie, lies almost entirely within the Catahoula NWR and the Saline Wildlife Management Area. Vegetation consists primarily of lowland hardwood forest subject to annual flooding from Catahoula Lake. Flow in this reach of Little River is restricted for the purpose of waterfowl management at Catahoula Lake. Generally, the lake is drained in the summer to encourage production of moist soil vegetation valuable to waterfowl. During the fall, the water level is raised in the lake to enhance commercial fishing resources, and is maintained for migratory waterfowl. This fluctuation in water levels may be encouraging the methylation of mercury, which has been shown to be accelerated in newly formed reservoirs due to sudden inundation of organic matter and exposure of soils containing mercury (TNRCC 2000). It is thought that the fluctuation of water levels allows mobilization of inorganic mercury, resulting in increased microbial methylation by sulfate reducing bacteria.

The purpose of this TMDL is to establish the acceptable loading of mercury from all sources so that mercury levels in fish tissue will decline and compliance with the narrative water quality standard will be achieved. This TMDL report identifies point source discharges to the watershed, and focuses on nonpoint sources from anthropogenic air emissions. While there are approximately 6,000 oil and gas wells scattered throughout the Little River/Catahoula Lake watershed, operations from these facilities should not contribute mercury to the watershed since there are no known sources of naturally occurring mercury based on the geology of the study area.

5.3 POINT SOURCES

Information on National Pollutant Discharge Elimination System (NPDES) permitted dischargers was obtained from the USEPA Permits Compliance System (PCS) and LDEQ records. In addition to identifying point source dischargers in subsegments 081601, 081602, 081603, 081605, 081606, 081607, 081608, 081609, 081610, and 081611 which are shown as the Watersheds of Interest on Figure 2.1, point source dischargers located in the Contributing Watershed delineated on Figure 2.2 were also considered. This was done to account for possible point source loadings from other watersheds hydrologically connected to Little River. From this investigation, there were 73 relevant facilities with individual permits that discharge to waterbodies hydrologically linked to Little River and Catahoula Lake (See Appendix C-3). It was determined that dischargers from general permits designated as GP, LAG, and LAR do not have reasonable potential to contain mercury, and therefore, are not included in the list. Only two facilities have mercury limitations in its permits. They are the Town of Jena/LaSalle wastewater treatment plant (Permit No. LA0033260) and Candence Environmental Energy (Permit No. LA0101559). The mercury load for Cadence Environmental Energy was not calculated since the permit authorizes only intermittent stormwater discharges. The calculated mercury loading to the watershed from these two facilities summarized in Table 5.1 is 0.18 pounds per year.

Table 5.1 NPDES Facilities with Mercury Limitations

NPDES No.	Facility Name	Hg Limit	Hg Load
LA0033260	Town of Jena/LaSalle	0.00048 lbs/day	0.18 lbs/yr
LA0101559	Cadence Environmental Energy	10 μg/L	NC

NC = Not Calculated

Studies on municipal wastewater treatment plants (WWTPs) indicate that trace levels of mercury can be present in discharges from these facilities. Municipal wastewater treatment facilities were assumed to discharge some mercury because mercury at low levels has been measured in WWTPs in Arkansas and other U.S. regions. The Arkansas Department of Environmental Quality conducted a monitoring study of five WWTPs in Arkansas using clean sampling procedures and ultra-trace level analyses, and found an average concentration of about 15.0 ng/L in municipal discharges (USEPA 2002). An Association of Metropolitan Sewerage Agencies (AMSA) study of 24 facilities in 6 states showed a range of average effluent concentrations of 3.1 ng/L to 9 ng/L with maximum effluent concentrations ranging from 5 to 29 ng/L (AMSA, 2002 Mercury Source Control and Pollution Prevention Program Evaluation-Final Report.)

Point source discharges of bioaccumulative chemicals like mercury may have particular local significance, apart from their contribution to the cumulative load. Point source discharges by their nature may create "hot spots" where observed elevated concentrations have potential impact on aquatic life, wildlife, and human health. Consequently, comparing contributions from the air and water sources may conceal the real impact of mercury from point source discharges. In many cases elevated receiving water concentrations may be dictated solely by the mercury concentration in the effluent as opposed to the mercury delivered from air deposition. This is supported by field data and will generally be true when comparing the near-field effects of effluent discharges relative to air sources.

Because effluent sampling for mercury in the past has been conducted without the benefit of newer clean techniques little is known about the potential to discharge mercury for the majority of dischargers in this watershed. It is possible that some dischargers may have mercury in their effluent at levels greater than 12 ng/l. Based on this information, USEPA believes that it is appropriate to assume that discharges from the municipal WWTPs (SIC 4952) in this watershed contain mercury levels equal to 12 ng/L. Based on this assumption, the estimated mercury loads from these facilities were calculated based on their permitted design flow. It should be noted that a flow of 10,000 gallons per day was assumed to estimate the mercury loading from municipal WWTPs where no permitted flow information was available. In addition, mercury loads from other facilities (not SIC 4952) were not calculated since there was no information on which to base an estimate. The total estimated mercury loading from existing point source dischargers is 0.76 lbs/yr as summarized in Appendix C-3. An important element of this TMDL report is that dischargers within the watershed will need to evaluate their potential to discharge mercury in order to demonstrate that a facility is discharging at levels consistent with the assumptions of this TMDL, i.e., at or below 12 ng/l.

5.4 NONPOINT SOURCES

5.4.1 Background Sources

Based on review of the geologic and soils studies available for the area, there are no known naturally occurring areas of mercury to which those concentrations found in local media can be attributed. As evidenced by the discussion of geology and soils (Section 2.2 and 2.3), no background mercury has been documented in the near-surface rock strata nor in soil associations of the area. The sediment deposits are consistent with floodplain and terrace deposits.

The nearest documented source of naturally occurring mercury is the cinnabar (HgS) "district" of southern Arkansas. The district is restricted to the southern portion of the

Ouachita Mountains (Scott and McKimmey 1997; Armstrong *et al.* 1995; Stone *et al*. 1995; Branner 1932).

The downstream extent of naturally occurring mercury into the water bodies of Louisiana has not been documented. For the Little River and Catahoula Lake watershed, a possible connection with the naturally occurring mercury found in Arkansas soils and waters is through the Ouachita River. As floodwaters deposited mixed alluvium around the French Fork of Little River, around the northeastern and western shores of Catahoula Lake, and upstream of Little River (Lytle and Sturgis 1962) since Recent times (roughly 11,000 years ago to present day), it is possible but not documented that these sediments could have contained mercury from the upstream Ouachita River waters and sediments. An extensive sampling and analysis program would be necessary to prove or disprove the presence of naturally occurring mercury, particularly considering the distance of several hundred miles along the bends of the Ouachita River upstream to the cinnabar district in Arkansas. Furthermore, the presence of mercury along the upstream reaches of Little River and its tributaries would not be explained by background mercury within Ouachita sediments and waters, as the latter's influence is only found around the lake and lower reach of Little River, and is limited by the Mississippi Valley escarpment (see the soils discussion in Section 2.3). Therefore, it is concluded that the presence of mercury as a background presence in the upper reaches of the Little River is unlikely, and that other nonpoint sources should be considered.

5.4.2 Air Sources

The following excerpt from the LDEQ Mercury 2000 Report, provides a helpful synopsis of the many and varied sources of mercury in Louisiana and the nation (Summary of Issues Related to Mercury Contamination of Fish, LDEQ, March 2000, http://www.deq.state.la.us/surveillance/mercury/mercsumm.htm).

"Ambient concentrations of mercury throughout the United States have increased significantly since the beginning of the industrial revolution. As a result of the proliferation of mercury in the environment, many of the fish people consume, including ocean caught species such as tuna, swordfish and shark purchased at local stores, are contaminated with low levels of mercury. Much of this is due to the fact that mercury is present in coal used at electrical power plants and is used in many products such as thermometers, fluorescent and mercury vapor lights, and electrical switches which may eventually be incinerated or placed in landfills. Mercury in these materials is released to the atmosphere as a gas by coal burning, trash incineration or direct volatilization. In a process similar to acid rain, the mercury is later deposited on the earth's surface through atmospheric deposition.

"Other sources of mercury emissions to the atmosphere include chloralkali plants, which use mercury cathodes to generate chlorine and alkali from brine using electricity, hazardous waste incinerators, and pulp and paper mills.

"Paper mills, waste incinerators, and chloralkali plants that are major sources under LDEQ's Air Toxics rule are required to report mercury emissions under the TEDI. Because of the nature of atmospheric mercury, the concentrations of mercury in Louisiana surface waters cannot be directly traced to air emissions from facilities located within Louisiana. Twenty-six facilities are currently included in LDEQ's TEDI. Electrical power plants are currently exempt from LDEQ's Air Toxics rule but not other air quality regulations, and are not required to report mercury or any other emissions as part of the TEDI."

Since mercury air emissions can be transported over long distances, these emissions are generally broken down into local, national, and global emissions. Local air emissions for these TMDLs are defined as the airshed within 100 kilometer (km) of the watershed as shown in Figure 2.2. While this encompasses parishes outside the fish consumption advisory area, only those areas that contribute flow to the study area are used to estimate watershed mercury loading from atmospheric deposition as described in Section 5.5.

The EPA BASINS model, Version 3, was used to estimate mercury loading to the watershed from both rainfall runoff and soil erosion. Actual mercury concentration and wet deposition data from the MDN were used in the model. Table 5.2 shows that the total estimated mercury loading from air sources to the watershed from both wet and dry deposition is 164 lbs/yr as discussed in Section 5.5. Therefore, nonpoint source pollutants from aerial deposition represents over 99 percent of the total loading to the watershed.

Table 5.2 Estimated Mercury Loading from Air Sources

Source	(kg/yr)	(lbs/yr)
Soil Erosion Load	10.78	24
Runoff Load	63.82	140
Total	74.60	164

5.5 WATERSHED MERCURY LOADING

While various analyses for watershed mercury loadings are possible at various complexity levels, the limited amount of data available for the Little River/Catahoula Lake watershed precluded the use of detailed dynamic modeling. As an alternative method, the mercury contributions to the Little River from the study area and contributing watershed and atmospheric components were calculated based on an annual mass balance approach. Watershed-scale loading of mercury to the Little River was simulated using the tools available in BASINS, Version 3 (USEPA 2001a).

The main component of the BASINS system utilized was the PLOAD model. PLOAD is a simplified, geographic information system (GIS)-based model intended to calculate pollutant loads for watersheds. PLOAD estimates nonpoint source loads on an annual average basis using either the export coefficient or USEPA's Simple Method approach.

The PLOAD model was employed to provide estimates of both the average annual runoff and eroded sediment total suspended solids (TSS) loads from each of the 17 subsegments that were considered. The hydrologic and TSS loading coefficients required by the model were developed from values available in the literature. The PLOAD model varies the loading coefficients by land use provided with GIS coverage. Figure 5.3 illustrates the land use characteristics for the 17 subsegments in the analysis. Appendix D-1 presents results of the PLOAD modeling for the Little River/Catahoula Lake watershed for both annual average runoff volumes and annual average TSS loads. Appendix D-5 includes the PLOAD Event Mean Concentration and Appendix D-6 includes the PLOAD Percent Impervious Cover used in the model.

The predominant source for mercury in the Little River watershed is atmospheric deposition. The wet deposition rates for each of the 17 subsegments were derived from the NADP MDN data available for the four Louisiana stations. Average annual wet deposition rates and rainfall mercury concentrations were calculated from these four stations as distance weighted averages. Appendix D-2 illustrates the derivation of both the weighted average mercury wet deposition rates and the weighted average rainfall mercury concentrations. The weighted averages were calculated based upon the inverse square of the distance from the individual NADP/MDN station to the centroid of the airshed.

To calculate the mercury load transported in the runoff from the Little River/Catahoula Lake watershed, the assumption was made that the runoff contains the same mercury concentration as the originating rainfall. The results calculated with this conservative assumption are shown in Appendix D-3. The estimated mercury load to the watershed from rainfall runoff is 63.82 kg/yr or 140 lbs/yr.

There are no measurements of soil mercury concentrations within the Little River watersheds or surrounding watersheds. There were a number of measurements of soil mercury concentrations taken at a variety of locations in the Savannah River, Georgia watershed where the average mercury wet deposition rate is 12.22 ng/m^2/year. Assuming that these soils are in equilibrium with the annual average wet deposition rate and that the resulting soil mercury concentrations are linearly proportional to the loading rate, the average Savannah River soil mercury concentration for the annual average mercury wet deposition rates calculated for each of the 17 subsegments were adjusted to yield the predicted soil mercury concentrations shown in Appendix D-4. Assuming that the sediment loads from Appendix D-1 have the same mercury concentration as the respective subsegment from which they originated, the calculated mercury loads from soil erosion for each subsegment are shown in Appendix D-4. The estimated mercury load to the watershed from soil erosion is 10.78 kg/yr or 24 lbs/yr.

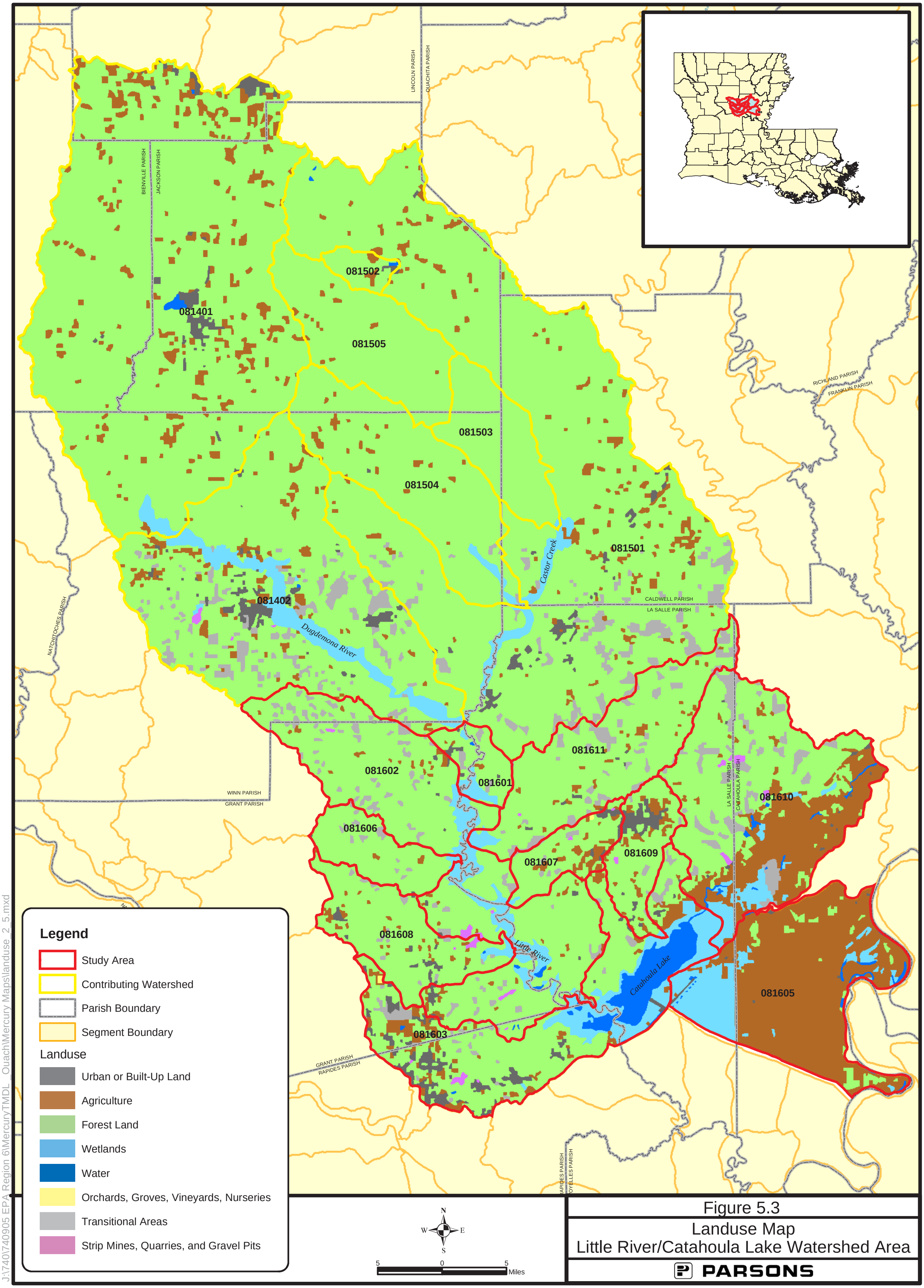


Figure 5.3
Landuse Map
Little River/Catahoula Lake Watershed Area

PARSONS

SECTION 6
TMDL CALCULATIONS

6.1 CURRENT LOAD EVALUATION

The current mercury load to the Little River/Catahoula Lake watershed is determined based on input from point sources and from both natural and air nonpoint sources. The estimated mercury load to the watershed from point sources is 0.76 lbs/yr as discussed in Section 5.3 and summarized in Appendix C-3, and 164 lbs/yr from air nonpoint sources as summarized in Table 5.2. USEPA concluded that there is no natural mercury load to the watershed based on the geology of the area. Table 6.1 summarizes the estimated current mercury loads.

Table 6.1 Summary of Estimated Current Mercury Loading

Source	Mercury Load (lbs/yr)	Percent of Load
Point Sources	0.76	0.5 %
Nonpoint Air Sources	164	99.5%
Total	164.76	100%

Estimated mercury loads from rainfall runoff and soil erosion are the major contributors to the total mercury load to the watershed. The fate and transport of mercury from water and sediments to fish tissue is complex and is influenced by local geochemical conditions. Fate and transport modeling of mercury once it is in the waterbody was not attempted since there is not enough site-specific data to calibrate and verify a model. Rather, USEPA assumed that 100 percent of the mercury load to the waterbody was available for uptake, bioaccumulation, and biomagnification by fish.

USEPA selected the average concentration of mercury in fish tissue for all species to best represent the concentration throughout the entire Little River/Catahoula Lake watershed. This average concentration for mercury in fish tissue, taken from Table 4.2, for all species at the four monitoring stations is 0.74 mg/kg as shown by Table 6.2.

Table 6.2 Mercury in Fish Tissue (mg/kg)

Site	Description	Average
0089	Little River Southwest of Jena	0.867
0810	Catahoula Lake East of Big Point	0.669
1010	Little River near Jonesville	0.512
1011	Old River Northwest of Archie	0.911
Watershed Average		0.740

The mercury concentration in fish tissue must be reduced by 32.4 percent to achieve the safe tissue concentration of 0.5 mg/kg. Therefore, the mercury load to the watershed must also be reduced by 32.4 percent or 53.38 lbs/yr. Calculations are shown below.

Percent Reduction = [(0.74 mg/kg - 0.50 mg/kg) / (0.74 mg/kg)] X 100 = 32.43%

Pollutant Load Reduction = (164.76 lbs/yr) X (32.4 % / 100) = 53.38 lbs/yr

6.2 TMDL DETERMINATION

The following equation was used to define the allowable loading of mercury, or the TMDL, to meet the endpoint.

TMDL = Current Estimated Pollutant Loading –Pollutant Load Reduction Necessary

TMDL = 164.76 lbs/yr – 53.38 lbs/yr = 111.38 lbs/yr

Table 6.1 shows that 99.5 percent of the mercury load to the watershed is from non-point air emission sources. Because point sources are a relatively small portion of the total mercury load to the system, no reductions in point sources loads are required in this TMDL. The calculated load of 0.76 lbs/yr is established as the TMDL waste load allocation. Demonstrations that these assumed waste loads are met will provide reasonable assurances that the TMDL is achievable.

6.3 MARGIN OF SAFETY

The CWA requires that TMDLs take into consideration a margin of safety (MOS). USEPA and LDEQ guidance allows for the use of implicit or explicit expressions of the MOS or both (Waldon 2000). When conservative assumptions are used in development of the TMDL, or conservative factors are used in the calculations, the MOS is implicit. When a percentage of the load is factored into the TMDL calculation as a MOS, the MOS is explicit. The following conservative assumptions were made providing an implicit MOS, as an explicit MOS was not considered appropriate.

- The estimated mercury concentration in runoff is equivalent to the concentration of mercury in the originating rainfall, which assumes no loss of mercury from adsorption or any other mechanism during overland flow.
- Calculations for mercury concentrations associated with TSS loading from soil erosion to the water column assume no loss of mercury from any mechanism during transport.
- Mercury loading to the watershed was considered 100 percent available for uptake, bioaccumulation, and biomagnification by fish.
- The permitted design flow of point source dischargers was used to calculate mercury loadings from WWTPs, rather than actual average flow rates, which are

typically much lower. This maximizes the predicted impact of discharges, and provides an allocation that is more protective.

6.4 TOTAL MAXIMUM DAILY LOAD

The estimated current mercury load to the Little River/Catahoula Lake watershed is 164.76 lbs/yr. This mercury load must be reduced by 53.38 lbs/yr to an allowable loading of 111.38 lbs/year. For this TMDL, the load is allocated between point and non-point sources as shown by Table 6.3. USEPA did not consider seasonal variability since the mercury deposition network (MDN) data did not show seasonal trends and because bioaccumulation in fish occurs over several years.

Table 6.3 TMDL Summary (lbs/yr)

TMDL Calculations	
Current Estimated Loading	164.76
Waste Load Allocation	0.76
Load Allocation	110.62
Margin of Safety	0
TMDL	111.38

The TMDL authorizes re-allocation of the individual WLAs among point sources and indeed assumes that this will occur, but only to the extent that the sum of re-allocated loads remain at or below the sum of the original individual WLAs (sometimes described here as the cumulative WLA). USEPA established this TMDL under the assumption that most wastewater facilities are discharging at or below 12 ng/l. The percent reductions and relative loading levels are predicated on this assumption. If a discharger desires a mercury allocation that accommodates mercury loadings above 12 ng/l, the TMDL explicitly assumes that the permitting authority can revise the individual WLA accordingly, but only if the sum of all individual WLAs does not exceed the cumulative WLA

SECTION 7
ONGOING AND FUTURE POLLUTANT LOADING REDUCTIONS

USEPA estimates that approximately 99.5 percent of the current mercury loadings to the Little River/Catahoula Lake watershed are from atmospheric deposition. As defined in Section 6.4 of this report, the total allowable load of 111.38 lbs/yr will necessitate a 32.43 percent reduction in mercury loading to achieve the applicable endpoint of 0.5 mg/kg in fish tissue. Consequently, significant reductions in atmospheric deposition within the airshed will be necessary. Ongoing and future reductions in mercury emissions using a multimedia approach provide reasonable assurance that WQSs will be attained. USEPA and LDEQ have taken key steps nationally and regionally toward reducing mercury emissions and environmental and human health risks associated with mercury exposure.

7.1 AIR AND WASTE

Based on the December 1997 Mercury Study Report to Congress (USEPA 1997), USEPA estimates that 60 percent of the total mercury deposited in the U.S. water bodies and contaminating fish comes from domestic anthropogenic air emission sources.

The largest emitter of mercury to the atmosphere is coal-fired electric power plants. In December 2000, USEPA announced its intent to regulate mercury air emissions from power plants. The agency will propose regulations by 2003 and issue final rules by 2004. In February 2002, President Bush announced the Clear Skies Initiative, a program that will dramatically reduce and cap emissions of nitrogen oxides, sulfur dioxide, and mercury. The initiative is projected to result in substantial emission reductions from power generators by 2020. In Louisiana, mercury emissions are expected to be reduced by 20 percent relative to 2000 emissions (http://www.epa.gov/clearskies/pdfs/LA-summary-9-16.PDF).

Under the Clean Air Act, the USEPA has issued stringent regulations for significant emitters of mercury which, once implemented, is expected to reduce nationwide emissions from anthropogenic sources by about 50 percent from 1990 levels. These actions include:

- Municipal Waste Combustors (MWC): In 1995, USEPA issued emission limits for MWCs based on maximum achievable control technology. The implementation date for new and existing MWCs was December 2000. Overall mercury emissions from MWCs were estimated to be 54 tons per year (tpy) in 1990 and are expected to reduce mercury emissions from these types of facilities by at least 90 percent.
- Medical Waste Incinerators (MWI): In August 1997, USEPA issued emission limits for MWIs. The implementation date for new and existing MWIs was September 2002. Overall mercury emissions from MWIs were estimated to be 50 tpy in 1990, were reduced to 16 tpy (primarily as a result of state regulations), and are estimated to be reduced by an additional 94 percent or more.
- Hazardous Waste Combustors (HWC): In 1999, USEPA issued emission standards for HWCs, including cement kilns and light weight aggregate kilns that

burn hazardous waste. Overall mercury emissions from HWCs were estimated to be 2.5 percent of the total national mercury emissions in 1990. This regulation has not been implemented pending final resolution of a lawsuit. Once fully implemented, mercury emissions from HWCs are expected to be reduced by at least 50 percent.

A combination of multiple state and federal programs will provide reasonable assurances that nonpoint sources of mercury can be reduced to levels necessary to meet the endpoint. The combined affect of these programs should translate to 50 percent reduction in annual emissions in Louisiana, which is greater than the 32 percent reduction required by these TMDLs.

7.2 MUNICIPAL AND INDUSTRIAL DISCHARGERS

USEPA assigned a gross waste load allocation of 0.76 lbs/year for all point source dischargers in the study area and contributing watershed. This assumes that all dischargers meet the mercury target concentration of 0.012 µg/L. This load is 0.5 percent of the TMDL load calculated in this TMDL Report. USEPA recognizes that this is a relatively small share of the allowable total mercury load to the watershed. However, USEPA also acknowledges that mercury is a highly persistent bioaccumlative pollutant that can contribute to mercury bioaccumulation. Regulations at 40 CFR Part 122.44(d)(1) require permitting authorities to determine "whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criterion within a state [or tribal] water quality standard," and to develop water quality-based NPDES permits accordingly. Although no specific reductions are required of point source discharges in this TMDL, these factors suggest that additional efforts by LDEQ and USEPA are necessary to demonstrate that discharges are meeting the assumed concentration of 0.012 µg/L.

USEPA will work with LDEQ to establish mechanisms for demonstration that these loads are being met. Mechanisms that could be used to demonstrate compliance may include a certification process demonstrating that there are no known or suspected operations that could reasonably be expected of discharging mercury. Effluent sampling may be necessary for dischargers that cannot meet the certification requirement. Sampling requirements, if applicable, should include sampling and analyses using clean methods. USEPA Method 1631 is now available which has a detection limit of 0.0002 µg/L or 0.2 ng/L. Mercury monitoring to meet the requirements of this TMDL should follow procedures as outlined in USEPA Method 1631. With these additional data, USEPA and LDEQ could consider the possibility of revising the TMDL at some point in the future if warranted.

If a facility is found to discharge mercury at levels above 12 ng/L, a mercury minimization plan is an example of a reasonable action to be taken. USEPA expects that the State of Louisiana, as the duly authorized permitting authority, will determine any additional necessary elements of a mercury characterization/minimization plan, considering the size and nature of the affected facility. LDEQ should address the need for additional permit requirements on a case-by-case basis. Through these actions, over the long-term, it can be demonstrated that waste load allocations are being met.

As presented, the Little River TMDL predicts compliance with water quality standards after full implementation of MACT controls on a nationwide basis. The TMDL estimates a needed reduction of approximately 33% with MACT controls resulting in a 50% reduction as a National average. Mercury minimization plans and/or numeric limits for point sources are still needed for two reasons. First, the assumed MACT reductions are a National average and do not adequately characterize the reductions that may or may not take place in and around the watershed. This leads to uncertainty about whether or not the needed reduction will actually be attained and if future assimilative capacity will exist. Second, the MACT reductions provide an indicator of overall reduction to the watershed and do not account for possible localized effects of effluent containing mercury. Local characteristics such as water velocity, bed substrate, oxygen content and microbial community structure all contribute to methylation potential. Since these characteristics have not been defined for each of the dischargers in the area, there exists the potential that effluent containing mercury may cause localized exceedences of the criteria and therefore, minimization plans and/or numeric limits are necessary in order to assure that the discharge does not cause and/or contribute to an exceedance of the applicable water quality standard. In conclusion, due to uncertainty in the TMDL analysis, mercury minimization plans and/or numeric limits are necessary to assure compliance with the water quality standards.

7.3 POLLUTION PREVENTION

Source reduction, through product substitution and innovation, is the key element to pollution prevention. The U.S. industrial demand for mercury dropped 75 percent from 1988 to 1997 (http://www.epa.gov/mercury). Reductions in mercury use are driven by voluntary efforts and by increasingly strict federal and state regulations, such as increasing regulation of mercury in products or outright bans on the use of mercury in products for which alternatives are available. For example, in 1996, USEPA eliminated the use of mercury in most batteries under the Mercury Containing and Rechargeable Battery Management Act. Other voluntary measures such as the commitment by the American Hospital Association to reduce the use of mercury-containing products will continue to decrease the amount of mercury available in the waste stream. Next to source reduction, recycling is fundamental to mercury pollution prevention. When mercury must be used and recycling is not a possibility, proper disposal is critical in reducing the potential of atmospheric dispersion.

7.4 LDEQ STATEWIDE MERCURY MONITORING PROGRAM

Over the past 4 years LDEQ has worked to expand its statewide mercury monitoring program. The primary objective of this program is to determine statewide mercury contamination levels of fish commonly eaten in Louisiana, as well as mercury concentrations in sediments, water, and epiphytic plant material, and mercury loadings from aerial deposition.

Fish tissue information provides input for analyses of risks to human health due to consumption of mercury-contaminated fish. This will allow LDHH and LDEQ to address public concerns regarding the safety of fish consumption from many water bodies. Epiphytic plant material is used to help further define the significance of atmospheric sources of mercury. Results of the epiphytic plant material analyses, together with fish tissue, water and sediment concentration information, will continue to help address questions regarding sources of mercury. Additional local and statewide remedial actions can be more effectively targeted to reduce mercury sources by combining data generated from this and previous projects and the knowledge of LDEQ field personnel. This project will also provide baseline data that can be used for ongoing trend analysis.

LDEQ's sampling site selection continues to evolve and is based on several needs. New sites are sampled in order to expand the extent of water bodies tested. Recently, sites have been selected in basin subsegments in which no previous sampling has occurred. In the next few years, all promulgated water bodies are expected to be sampled for mercury contamination. Water bodies currently under an advisory for mercury are resampled annually. Finally, some water bodies are resampled if LDHH determines additional samples are needed in order to make a decision regarding the need for fish consumption advisories.

Beginning in October 1998, LDEQ implemented an air monitoring program designed to assess the geographical extent and quantity of atmospheric mercury deposition. Air monitors were set up at the Southeastern University Campus in Hammond, Louisiana, McNeese State University in Lake Charles, Louisiana, and at the Louisiana State University sweet potato farm in Chase, Louisiana (See Figure 2.2). Samples are tested for wet deposition of total mercury during rainfall events. If possible, samples are collected weekly. LDEQ's air monitoring sites are part of the National Atmospheric Deposition Program (NADP) and the MDN.

As of December 2000, weekly data from October 1998 through June 2000 were available. The data show mercury levels are being detected regularly in rainwater. The data are analyzed by the NADP staff, and any future reports concerning the deposition data will be published by the NADP. Any interested party may access the data at the following website: http://nadp.sws.uiuc.edu/mdn.

LDEQ adheres to well-defined sampling procedures and a quality assurance project plan when collecting mercury data. These procedures are outlined in the Mercury Monitoring Report Program (LDEQ 2000) located at http://www.deq.state.la.us/surveillance/mercury/2000report/program.htm and in the *Quality Assurance Project Plan Surface Water Monitoring and Analysis* that was followed throughout this monitoring program (LDEQ 1991b). USEPA will work with LDEQ to modify future state sampling and analysis methods to utilize clean methods that ensure appropriate detection limits for metals. This program is an important tool for LDEQ in evaluating the progress of the mercury reductions that are prescribed by these TMDLs. LDEQ's targeted data collection efforts in subsegments with fish consumption advisories will provide the data necessary to ultimately remove the fish consumption advisory or revise the TMDL at some point in the future, if warranted.

SECTION 8
PUBLIC PARTICIPATION

When USEPA establishes a TMDL, 40 C.F.R. § 130.7(d)(2) requires USEPA to publish a public notice and seek comments concerning the TMDL. USEPA prepared this TMDL pursuant to the consent decree, Sierra Club, *et al*. v. Clifford *et al*., No. 96-0527, (E.D. La.) signed and entered April 1, 2002. Federal regulation requires that public notice be provided through the Federal Register and through newspapers in the local area. The Federal Register notice was issued on December 20, 2002 (Volume 67, Number 245, page 77994). This TMDL was also noticed in local newspapers. Comments and additional information were submitted during the 30-day public comment period and this TMDL has been revised accordingly. Comments and responses are found in Appendix E. USEPA will provide notice to LDEQ that this TMDL has been made final. USEPA will also request LDEQ to incorporate the TMDL into the state Water Quality Management Plan.

SECTION 9
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APPENDIX A
FISH CONSUMPTION ADVISORY

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GOVERNOR

David Hood
Secretary
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The following fish consumption advisory was issued on 11/20/00 by the Department of Health & Hospitals, the Department of Environmental Quality, and the Department of Wildlife & Fisheries. For more information, please contact:

DHH
Robert Starszak
(504) 568-8537

DEQ
Chris Roberie
(225) 765-0634

DWF
Gary Tilyou
(225) 765-2343

FISH CONSUMPTION ADVISORY FOR THE LITTLE RIVER AT BODIE'S LANDING

Based on fish sampling of the Little River at Bodie's Landing in Grant and La Salle parishes, unacceptable levels of mercury have been detected in largemouth bass, white crappie, freshwater drum, flathead catfish, and bowfin. The advisory includes Little River from Highway 500 near Georgetown to the weir near Archie, including Catahoula Lake. Therefore, the Louisiana Department of Health & Hospitals, Department of Environmental Quality, and Department of Wildlife & Fisheries advise that the following precautions be taken when eating fish taken from the Little River at Bodie's Landing.

- **Pregnant women, breast-feeding women, women planning to be pregnant, and children less than seven years of age should NOT consume largemouth bass, freshwater drum, flathead catfish, or bowfin from the advisory area and should consume no more than TWO MEALS PER MONTH of white crappie (a meal is considered to be half a pound of fish for adults and children). There are no limits on other species.**

- **Non-pregnant women, women not planning to become pregnant, men, and children seven years of age and older should consume no more than TWO MEALS PER MONTH of largemouth bass, freshwater drum, flathead catfish, and bowfin combined from the advisory area. There are no limits on other species.**

Mercury is an element that occurs naturally in the environment. It is released into the environment through natural processes and human activities. Consequently, there are small amounts of mercury in lakes, rivers, and oceans. Nearly all fish contain trace amounts of mercury. They absorb mercury from the water and sediment as they feed on aquatic organisms. Larger predator fish contain more mercury than smaller fish. Therefore, in general, it is recommended that smaller fish be consumed instead of larger ones.

People are exposed throughout their lives to low levels of mercury. One way they can be exposed to mercury is from eating contaminated fish. Health effects from harmful levels of mercury can include nervous system and kidney damage. Developing fetuses are more sensitive to the toxic effects of mercury, especially in the first trimester. In addition to developing fetuses, infants and children are more sensitive to the effects of mercury; therefore, consumption advisories are issued at lower fish tissue concentration levels for these groups.

This advisory is issued as a precaution. Further sampling will be carried out by the Louisiana Department of Environmental Quality to determine the need for modifications to this advisory. If you have consumed largemouth bass, bowfin, flathead catfish, freshwater drum, and/or white crappie from these waters, it is not likely that there is an immediate need to be concerned about the effects of mercury. However, you should consult your personal doctor if you are concerned.

Jimmy Guidry, MD

Jimmy Guidry, M.D.
State Health Officer and Medical Director
Department of Health & Hospitals

Madeline W. McAndrew

Madeline McAndrew
Assistant Secretary, Office of Public Health
Department of Health & Hospitals

David W Hood

David Hood
Secretary
Department of Health & Hospitals

Dale Givens

J. Dale Givens
Secretary
Department of Environmental Quality

James H. Jenkins, Jr.
Secretary
Department of Wildlife & Fisheries

APPENDIX B
FISH TISSUE DATA

Table B.1 Mercury Concentrations (Wet Weight) in Fish Tissue from Fish Sampled at Site 0089

Date	Species	Weight (g)	Length (cm)	Number	Value (ppm)
10/08/96	LARGEMOUTH BASS	548.10	33.80	6	.752
10/08/96	LARGEMOUTH BASS	1162.40	43.70	2	.742
10/08/96	LARGEMOUTH BASS	1715.20	49.00	2	1.402
10/08/96	LARGEMOUTH BASS	2664.90	56.70	1	2.438
10/08/96	BOWFIN	2792.50	66.80	2	1.731
10/08/96	BLACK CRAPPIE	205.50	23.90	4	.458
10/08/96	BLACK CRAPPIE	345.90	27.20	5	.143
10/08/96	BLACK CRAPPIE	496.10	31.90	2	.227
10/08/96	BLUEGILL SUNFISH	113.40	18.10	7	.077
10/08/96	CHANNEL CATFISH	524.50	40.60	2	.289
05/16/00	LARGEMOUTH BASS	418.20	30.90	8	.786
05/16/00	LARGEMOUTH BASS	602.40	35.50	4	1.317
05/16/00	LARGEMOUTH BASS	1011.20	40.80	3	1.473
05/16/00	LARGEMOUTH BASS	1219.10	44.70	2	1.781
05/16/00	WHITE CRAPPIE	164.40	23.20	5	.246
05/16/00	WHITE CRAPPIE	255.20	26.00	2	.345
05/16/00	WHITE CRAPPIE	652.10	34.40	1	1.136
05/16/00	BLACK CRAPPIE	340.20	27.50	4	.609
05/16/00	SMALLMOUTH BUFFALO	1908.90	46.40	3	.516

Table B.2 Mercury Concentrations (Wet Weight) in Fish Tissue from Fish Sampled at Site 1010

Date	Species	Weight (g)	Length (cm)	Number	Value (ppm)
06/01/00	LARGEMOUTH BASS	453.60	31.70	3	.337
06/01/00	LARGEMOUTH BASS	581.20	34.70	4	.378
06/01/00	LARGEMOUTH BASS	1275.80	43.50	1	.739
06/01/00	LARGEMOUTH BASS	1956.20	49.90	1	1.177
06/01/00	WHITE BASS	444.20	33.00	3	.457
06/01/00	WHITE BASS	637.90	37.30	2	.776
06/01/00	WHITE CRAPPIE	222.10	25.40	6	.210
06/01/00	WHITE CRAPPIE	326.00	27.50	2	.218
06/01/00	WHITE CRAPPIE	482.00	31.30	4	.368
06/01/00	FRESHWATER DRUM	517.40	34.30	4	.588
06/01/00	FRESHWATER DRUM	708.80	37.80	1	1.007
06/01/00	FRESHWATER DRUM	1800.20	49.50	2	.813
06/01/00	BLUE CATFISH	552.80	38.20	2	.264
06/01/00	BLUE CATFISH	963.90	45.80	2	.384

Date	Species	Weight (g)	Length (cm)	Number	Value (ppm)
06/01/00	BLUE CATFISH	2735.80	63.90	2	.788
06/01/00	FLATHEAD CATFISH	2721.00	62.00	1	.718
09/19/01	BLUE CATFISH	666.20	42.70	2	.283
09/19/01	BLUE CATFISH	1143.50	49.60	3	.281
09/19/01	BLUE CATFISH	1701.00	56.60	2	.307
09/19/01	FRESHWATER DRUM	269.30	28.90	4	.314
09/19/01	FRESHWATER DRUM	916.70	41.60	3	.901
09/19/01	FRESHWATER DRUM	1162.40	45.80	2	1.023
09/19/01	LARGEMOUTH BASS	436.60	30.60	5	.380
09/19/01	LARGEMOUTH BASS	585.90	34.00	3	.609
09/19/01	LARGEMOUTH BASS	793.80	37.40	4	.552
09/19/01	LARGEMOUTH BASS	1162.40	43.00	1	.634
09/19/01	SMALLMOUTH BUFFALO	2239.70	49.60	3	.296
09/19/01	WHITE CRAPPIE	239.00	26.20	7	.210
09/19/01	WHITE CRAPPIE	306.20	27.30	5	.294
09/19/01	WHITE CRAPPIE	406.40	30.40	3	.141
09/19/01	WHITE CRAPPIE	496.10	32.90	4	.424

Table B.3 Mercury Concentrations (Wet Weight) in Fish Tissue from Fish Sampled at Site 0810

Date	Species	Weight (g)	Length (cm)	Number	Value (ppm)
05/17/01	BLUE CATFISH	652.10	41.60	4	.528
05/17/01	BLUE CATFISH	935.60	46.80	2	.379
05/17/01	CHANNEL CATFISH	652.10	38.90	2	.270
05/17/01	FRESHWATER DRUM	283.50	28.40	2	.324
05/17/01	FRESHWATER DRUM	822.20	38.60	1	1.003
05/17/01	LARGEMOUTH BASS	436.60	30.50	5	.552
05/17/01	LARGEMOUTH BASS	496.10	33.30	2	.417
05/17/01	LARGEMOUTH BASS	808.00	38.10	2	.471
05/17/01	LARGEMOUTH BASS	1219.10	42.10	1	.909
05/17/01	LARGEMOUTH BASS	1559.30	46.50	1	1.362
05/17/01	WHITE BASS	793.80	39.50	2	1.470
05/17/01	WHITE CRAPPIE	326.00	27.30	2	.338

Table B.4 Mercury Concentrations (Wet Weight) in Fish Tissue from Fish Sampled at Site 1011

Date	Species	Weight (g)	Length (cm)	Number	Value (ppm)
05/30/00	FLATHEAD CATFISH	3118.50	64.30	1	.713
05/30/00	FLATHEAD CATFISH	14770.40	99.50	1	1.428
05/30/00	FRESHWATER DRUM	623.70	36.20	3	.899
05/30/00	FRESHWATER DRUM	793.80	39.30	2	1.343
05/30/00	FRESHWATER DRUM	1134.00	43.40	2	.975
05/30/00	LARGEMOUTH BUFFALO	680.40	35.30	3	.787
05/30/00	LARGEMOUTH BUFFALO	1431.70	44.50	2	1.111
05/30/00	LARGEMOUTH BUFFALO	1743.50	49.00	2	1.418
05/30/00	WHITE CRAPPIE	238.10	25.40	5	.344
05/30/00	WHITE CRAPPIE	364.50	29.00	7	.529
05/30/00	WHITE CRAPPIE	453.60	30.60	5	.479

APPENDIX C
LOUISIANA AIR EMISSIONS AND LIST OF NPDES DISCHARGERS

Table C.1 TEDI Mercury Emissions within Project Airshed[1] (lbs/yr)

COMPANY[2]	PARISH	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
BOISE CASCADE-OAKDALE PLYWOOD	Allen								910	3	3	3
BOISE CASCADE - SOUTHERN OPS	Beauregard		4	3	61	56	55	48	111	60	1	1
WESTVACO	Beauregard			2	2	2	2	2	1			
PPG INDUSTRIES, INC.											6	6
REYNOLD METALS LC CARBON											1	1
INTERNATIONAL PAPER-MANSFIELD	De Soto		75	66	67	218	260	240	240	40	36	47
GEORGIA PACIFIC CORPORATION	E Baton Rouge		83	81	143	73	69	73	70	2	2	21
CABOT CORPORATION											5	5
RHODIA, INC.	E Baton Rouge									0		
ROLLINS ENVIRON. SERVICES, INC	E Baton Rouge	1	2	2	9	9						
SAFETY-KLEEN	E Baton Rouge								0	0		
GEORGIA GULF CORPORATION											7	1
SYNGENTA CROP PROTECTION												4
DOW U.S.A., PLAQUEMINE SITE	Iberville	44	127		588	227	16			1		
NOVARTIS CROP PROTECTION INC.	Iberville								3	15	6	
STONE CONTAINER CORPORATION	Jackson		49	49	48	48	12	18	18	0		
LA-PACIFIC CORP., URANIA CMPLX	La Salle	2	2	2	2	2				3		
INTERNATIONAL PAPER	Morehouse		83	66	66	99	92	91	87	87	16	14
WILLAMETTE IND., INC. RED RIVER	Natchitoches			21	20	15	15	16	16	16	17	1
RIVERWOOD INTERNATIONAL PLNT31	Ouachita		53	54	56	16	14	14	14	20	4164	18
INTERNATIONAL PAPER-PINEVILLE	Rapides		45	46	47	2	95	60	57	60	56	71
MOTIVA-NORCO, ENTERPRISES												12
SHELL OIL-NORCO-EAST SITE											13	14
MOTIVA ENTERPRISES, LLC												9
CROWN PAPER COMPANY	West Feliciana					29		20	20	29	3	1
JAMES RIVER CORP.	West Feliciana		14	27	27							
Yearly Totals		47	537	419	1,136	796	630	582	1,547	333	4,336	229

1 See Figure 2.2 for delineation of project airshed.

2 Companies without a location (parish) were assumed to be within the project airshed to make a more conservative estimate of air deposition sources.

Source: http://www.deq.state.la.us/surveillance/mercury/2000report/intro.htm

Table C.2 TEDI Mercury Emissions Outside Project Airshed (lbs/yr)

COMPANY	PARISH	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
RUBICON INC	Ascension	15	13	13	13	14	25	23	30	33	32	12
CONDEA VISTA-CHEMICAL COMPLEX	Calcasieu							20				
LYONDELL CHEMICAL, LK. CHARLES	Calcasieu									0		
PPG INDUSTRIES, INC.	Calcasieu	1,210	1,208	1,238	1,282	1,287	1,281	1,228	1,220	1,222	1218	1216
SUNLAND FABRICATORS/WALKER	Livingston								67			
UNION CARBIDE	St Charles	1				3	3	4	3	1	1	1
MARINE SHALE PROCESSORS. INC.	St Mary	30	25	22								
GAYLORD CONTAINER CORPORATION	Washington		91	80	87	83	85	90	89	88	91	96
Yearly Totals		1,256	1,337	1,353	1,382	1,387	1,394	1,365	1,409	1,344	1,342	1,325

Source: http://www.deq.state.la.us/surveillance/mercury/2000report/intro.htm

Appendix C-3
NPDES Discharge Permits

NPDES	Company/Facility Name	Basin Segment	Parish	SIC	Facility Type	Receiving Waters	Permitted Flow (MGD)	Estimated Annual Load (lbs/yr)
Little River/Catahoula Lake Watershed								
LA0101559	CADENCE ENVIRONMENTAL ENERGY INC./ PINEVILLE DISTN CENTER	081603	Rapides	4953	HAZARDOUS WASTE-DERIVED FUEL	DITCH-BAYOU FLAGON-CATAHOULA LAKE	NA	0.0000
LA0068012	LASALLE PH SANITARY LANDFILL	0816	LaSalle	4953	MUNICIPAL SANITARY LANDFILL	LITTLE CHICKASAW CREEK	NA	0.0000
LA0043958	VILLAGE OFHARRISONBURG WWTP	081610	Catahoula	4952	POTW	STOKES CREEK-BAYOU BRUSHLEY	0.010	0.0004
LA0033260*	TOWN OFJENA/LASALLE WWTP	081609	LaSalle	4952	MUNICIPAL STP**	WEST PRONG CREEK-HEMPHILL CREEK	0.560	0.1800
LA0052591	TOWN OF POLLOCK WWTP	081608	Grant	4952	MUNICIPAL STP	BIG CREEK	0.010	0.0004
LA0064963	VILLAGE OF DRY PRONG WWTP	081608	Grant	4952	STP	BIG CREEK-LITTLE RIVER	0.050	0.0018
LA0098558***	TOWN OF POLLOCK / AIRPORT STP	081603	Grant	4952	WWTP	BACON BRANCH OF FLAGON BAYOU	0.290	0.0106
LA0048992	VILLAGE OF GEORGETOWN	081601	Grant	4952	STP	MAXIE CREEK TO LITTLE RIVER	0.100	0.0037
LA0033278	JENA/LASALLE WIRE & CABLE CO. / BELDEN CO., #2 FACILITY	0816	LaSalle	4952	STP		0.010	0.0004
LA0079545	TOWN OF BALL WWTP	0816	Rapides	4952	WWTP	FLAGON BAYOU	0.010	0.0004
LA0039098	RAPIDES PAR SEW DIST #2/ PINEBROOK ESTATES SUBD		Rapides	4952	RESIDENTIAL STP	KITCHEN CREEK	0.126	0.0046
LA0049760	STATE OF LA MILITARY DEPT / PINECREST STATE SCH CAMP BEAUREGARD	0816	Rapides	4952	SCHOOL STP	FLAGON BAYOU-CATAHOULA LAKE	1.325	0.0484
LA0032379	TOWN OF OLLA	0815	LaSalle	4952	WWTP	BEAR CREEK	0.160	0.0058
LA0040991	TOWN OF URANIA	0815	LaSalle	4952	WWTP	CHICKASAW CREEK-CASTOR CREEK	0.280	0.0102
LA0049905	TOWN OF CHATHAM	0815	Jackson	4952	WWTP	UNAMED DITCH-EDWARDS CREEK	0.080	0.0029
LA0060712	COLUMBIA HEIGHTS SD#1	0815	Caldwell	4952	WWTP	HURRICANE CREEK/BLACK BAYOU	0.235	0.0086
LA0082210	VILLAGE OF CLARKS	0815	Caldwell	4952	WWTP	HURRICANE CREEK B. CASTOR	0.147	0.0054
LA0108359	PLACID PPLN CO LLC / NEBO & LARTO MIX STORAGE	081603	LaSalle	4612	PETRO STORAGE & TRANSFER	DEVILS C-CATAHOULA L-LITTLE R-RED R	NA	0.0000
LA0007790	BELDEN CORP./DIV. OF COOPER IND. / LASALLE PLT.	0816	LaSalle	3357	WIRE & CABLE MANUFACTURE	HEMPHILL CREEK	NA	0.0000
LA0047546	FARMLAND INDUSTRIES INC / POLLOCK NITROGEN PLANT	081602	Grant	2873	ANHYDROUS AMMONIA/NITROGEN	LITTLE RIVER - CATAHOULA LAKE	NA	0.0000
LA0007501*	DYNEA-WINNFIELD PLANT	0815	Winn	2869		SEG 081402_OUACHITA RIVER BASIN	0.080	0.0029
LA0002780	POWER SILICATES INC	081603	Rapides	2819	GLASS MFG-SODIUM SILICATE	FLAGON BAYOU	NA	0.0000
LA0081574	HUNT PLYWOOD CO INC / POLLOCK PLYWOOD MILL	081602	Grant	2436	SOFTWOOD PLYWOOD	DITCHES-MILL CREEK	0.004	0.0001
Dugdemona Watershed								
LA0052761	McClendon, Glen Trucking Co	081401	Lincoln	7542	Carwashes		NA	0.0000
LA0104043	Winnfield Compaction Station	081402	Winn	4953	POTW	Creosote Branch	NA	0.0000
LA0038539	City of Jonesboro	081401	Jackson	4952	Sanitary Wastewater, East Oxidation Pond	E. Garrett Creek-Little Dugdemona River	0.300	0.0110
LA0038547	City of Jonesboro	081401	Jackson	4952	Sanitary Wastewater, North Oxidation Pond	Garrett Creek-Dugdemona River	0.200	0.0073
LA0046477	City of Jonesboro	081401	Jackson	4952	Sanitary Wastewater, South Oxidation Pond	Ditch-Garrett Creek-Little Dugdemona River	0.500	0.0183
LA0039756	Village of East Hodge	081401	Jackson	4952	Sanitary Wastewater	Little Dugdemona-Dugdemona River	0.060	0.0022
LA0039829	Village of North Hodge	081401	Jackson	4952	Sanitary Wastewater	Ditch-Dugdemona River	0.062	0.0023
LA0065102	Village of Simsboro	081401	Lincoln	4952	Sanitary wastewater	Madden Creek-Dugdemona River	0.158	0.0058
LA00388228	Town of Grambling	081401	Lincoln	4952	Sanitary wastewater	Redwine Creek-Dugdemona River	1.500	0.0548
LA0032042	Ruston Development Center	081401	Lincoln	4952	Sanitary wastewater	Spring Creek-Madden Creek-Dugdemona	0.025	0.0009
LA0036331	City of Ruston, South Side Plant	081401	Lincoln	4952	Sanitary wastewater	Future Site - Unknown	0.010	0.0004
LA0054704	Grambling State University (Closed)	081401	Lincoln	4952	Sanitary wastewater	River	0.010	0.0004
LA0033201	Village of Hodge (South Forth St.)	0814	Jackson	4952	Sanitary wastewater		0.010	0.0004
LA0043915*	City of Winnfield	081402	Winn	4941	Water Supply	Creosote Branch	1.430	0.0522
LA0103012	Dependable Tank Lines	081402	Winn	4213	Trucking Co - Truck Wash	Dugdemona River	NA	0.0000
LA0108189	GE Rail Car Repair Service	081401	Jackson	4011	Railcar repair service	Little Dugdemona River	NA	0.0000
LA0046281	Pabco Inc. (formerly Calsilite Group)	081401	Lincoln	3299	mfg	Madden Creek	0.002	0.0001
LA0105481	LA Industries, a Division of TXI, Plant #12	081401	Jackson	3273	ready mix concrete	Little Dugdemona Creek	NA	0.0000
LA0007650	Ball-Foster Glass Container Co	081401	Lincoln	3221	container mfg	Madden Creek-Mill Creek	0.0241	0.0009
LA0007501*	Neste Resins Corp	081402	Winn	2821	Synthec Resin	Brushy Creek	NA	0.0000
LA0007684*	Smurfit-Stone Hodge Mill/Plant	081401	Jackson	2621	Paper Mill	Dugdemona River	8.500	0.3105

Appendix C-3
NPDES Discharge Permits

NPDES	Company/Facility Name	Basin Segment	Parish	SIC	Facility Type	Receiving Waters	Permitted Flow (MGD)	Estimated Annual Load (lbs/yr)
LA0097721	Willamette Industries, Arcadia Oriented Strand Beam Plant	081401	Lincoln	2493	Sanitary wastewater, stormwater	Unnamed tributary-Dugdemona River	0.0018	0.0001
LA0106259	Willamette Industries, Simsboro Laminated Beam	081401	Lincoln	2493	Sanitary wastewater, stormwater	Madden Creek	0.0015	0.0001
LA0007803	Willamette Industries, Surepine Div.	081401	Lincoln	2493	Sanitary wastewater, particleboard mfg		NA	0.0000
LA0101940	Mid-State Wood Preservers	081401	Lincoln	2491	treating	Dugdemona River	0.0008	0.0000
LA0076953	Willamette Industries, Dodson Sawmill/Plywood Plant	081401	Winn	2432	& sawmill	Antwine Creek-Big Creek-Dugdemona River	0.0025	0.0001
LA0102016	Barnes Hardwood Inc.	081401	Lincoln	2421	Lumber Mill	Unnamed Streams-Madden Creek	NA	0.0000
LA0007498	Plum Creek Manufacturing	081402	Winn	2411	Saw Mill	Black Bayou	NA	0.0000
LA0105104	Tony James Logging	081402	Winn	2411	Logging Equipment/Repair	Brushy Creek-Dugdemona River	NA	0.0000
LA0103080	James Drilling	081402	Winn	1389	Oilfield Service	Dugdemona River	NA	0.0000
LA0007757	Jonesboro Generating Plant	081401	Jackson		Stormwater, power plant	Little Dugdemona River	NA	0.0000
LA0055832	Winnfield Limestone Quarry	0814	Winn		Limestone Quarry		NA	0.0000
Castor Creek Watershed								
LA0107531	D&M Unlimited LLC	0815	Caldwell	7542		Black Bayou	NA	0.0000
LA0032379	Town of Olla	0815	La Salle	4952	WWTP, Oxidation lagoon	Bear Branch-Chickasaw Creek	0.048	0.0017
LA0040991	Town of Urania	0815	La Salle	4952	WWTP	Chickasaw Creek	0.028	0.0010
LA0049905	Town of Chatham	0815	Jackson	4952	WWTP	Unnamed ditch-Edwards Creek	0.010	0.0004
LA0060712	Columbia Heights Sewer District	0815	Caldwell	4952	WWTP	Hurricane Creek-Black Bayou	0.025	0.0009
LA0082210	Village of Clarks	0815	Caldwell	4952	WWTP	Hurricane Creek-B. Castor	0.010	0.0004
LA0097110	Koch Transportation-Olla Compression Station	0815	La Salle	4922	NG Compression Station	Ditch-Chickasaw Creek	NA	0.0000
LA0103012	Dependable Tank Lines	0815	Winn	4213		Dugdemona River	NA	0.0000
LA0108189	General Electric Rail Car Repair Service	0815	Jackson	4011		Little Dugdemona River	NA	0.0000
LA0105481	LA Industries, a Division of TXI, Plant #12	0815	Jackson	3273		Little Dugdemona Creek	NA	0.0000
LA0064424	Cavenham Forest Industries	0815	La Salle	2491	Wood Preserving	Mill Branch-Castor Creek	NA	0.0000
LA0007668	Louisiana Pacific	81501	La Salle	2436	Soft wood, veneer & plywood	Unnamed Creek-Chicasaw Creek	0.040	0.0015
LA0098884	Hunt Plywood	0815	La Salle	2421		Unnamed creek-Chickasaw Creek	0.001	0.0000
LA0098884	Hunt Forest Prod Inc.	081501	La Salle	2421	Hardwood Sawmill	Unnamed Tributary-Chickasaw Creek	NA	0.0000
LA0007498	Plum Creek Manufacturing	0815	La Salle	2411		Black Bayou	0.040	0.0015
LA0065200	International Paper Co/INTL Paper Standard Woodyard	0815	La Salle	2411		Chickasaw Creek	NA	0.0000
LA0105104	Tony James Logging	0815	Winn	2411		Brushy Creek - Dugdemona River	NA	0.0000
LA0103080	James Drilling	0815	Winn	1381		Ditch - Dugdemona River	NA	0.0000
							TOTAL	**0.7614**

* Major Facility Estimated Load (lbs/yr) = Flow (MGD) X Concentration (mg/L) X Conversion Factors

** From Table 5.1 ***LA0098558 Load = 0.29 X 12.0/10^6 X 8.34 X 365 = 0.0106 lbs/yr

NA - Not Available

APPENDIX D
SUPPORTING DATA FOR ESTIMATING WATERSHED MERCURY LOADING

Appendix D-1
PLOAD Results
for Flow and TSS

Subsegment	Subasin Description	Basin	TSS Load (lb/yr)	Area (acres)	Flow Rate (cfs)	Flow Volume (cf/yr)	TSS Yield (lb/ac/yr)
081401	Dugdemona River - Headwaters to Big Creek	Ouachita	85,863,861.84	437,001	813.73	25,661,894,884.70	196.48
081402	Dugdemona River - From Big Creek to Little River	Ouachita	12,052,729.37	243,163	558.09	17,599,849,446.55	49.57
081501	Castor Creek - Headwaters to Little River	Ouachita	1,754,519.32	468,241	920.78	29,037,786,983.93	3.75
081502	Chatham Lake	Ouachita	7,462,610.39	9,749	18.50	583,539,901.66	765.47
081503	Beaucoup Creek - Headwaters to Castor Creek	Ouachita	17,486,347.79	45,874	84.96	2,679,362,961.57	381.18
081504	Flat Creek - Headwaters to Castor Creek	Ouachita	49,381,235.92	103,049	197.57	6,230,708,134.40	479.20
081505	Caney Lake	Ouachita	77,841,197.23	72,804	133.41	4,207,105,308.60	1,069.19
081601	Little River - Confluence of Castor Creek and Dugdemona	Ouachita	18,679,002.33	18,252	45.17	1,424,548,226.61	1,023.42
081602	Little River - From Bear Creek to Catahoula Lake (Scenic)	Ouachita	37,946,448.78	182,667	417.32	13,160,586,795.46	207.74
081603	Catahoula Lake	Ouachita	34,622,088.34	139,657	421.57	13,294,639,026.87	247.91
081605	Little River - From Catahoula Lake to dam at Archie	Ouachita	3,442,118.10	122,357	272.33	8,588,137,147.65	28.13
081606	Fish Creek - Headwaters to Little River (Scenic)	Ouachita	6,237,295.01	31,018	60.82	1,917,935,482.56	201.08
081607	Trout Creek - Headwaters to Little River (Scenic)	Ouachita	5,194,944.08	25,368	49.58	1,563,546,382.16	204.78
081608	Big Creek - Headwaters to Little River (Scenic)	Ouachita	5,590,024.39	55,834	110.26	3,477,238,245.13	100.12
081609	Hemphill Creek - Headwaters to Catahoula Lake (includes	Ouachita	29,530,286.15	31,794	61.18	1,929,503,400.31	928.80
081610	Old River - Catahoula Lake to Little River	Ouachita	10,188,561.91	153,554	329.48	10,390,381,278.09	66.35
081611	Bayou Funny Louis - Headwaters to Little River	Ouachita	36,066,012.26	93,084	191.77	6,047,535,571.02	387.46
		TOTALS	**353,475,421.39**	**2,233,466**		**147,794,299,177.27**	

Appendix D-2

Weighted Average Hg Deposition Calculations from NADP/MDM Stations

Subsegment Number	Subsegment Description	Centriod X Coordinate	Centriod Y Coordinate	Weighted Average Hg Wet Deposition (ng/m^2/day)	Weighted Average Rainfall Hg Concentration (ng/l)
081401	Dugdemona River - Headwaters to Big Creek	2,811,541.37	3,829,610.72	41.55	15.28
081402	Dugdemona River - From Big Creek to Little River	2,836,105.79	3,806,999.12	41.75	15.40
081501	Castor Creek - Headwaters to Little River	2,863,958.97	3,829,610.25	41.85	16.24
081502	Chatham Lake	2,836,286.20	3,852,015.14	41.66	15.75
081503	Beaucoup Creek - Headwaters to Castor Creek	2,859,525.62	3,833,660.81	41.83	16.17
081504	Flat Creek - Headwaters to Castor Creek	2,849,242.71	3,826,139.71	41.79	15.93
081505	Caney Lake	2,839,112.83	3,843,272.38	41.71	15.80
081601	Little River - Confluence of Castor Creek and Dugdemona	2,866,635.32	3,791,297.74	41.94	15.42
081602	Little River - From Bear Creek to Catahoula Lake (Scenic)	2,865,572.19	3,777,943.95	42.06	14.73
081603	Catahoula Lake	2,883,430.82	3,761,782.33	42.57	13.48
081605	Little River - From Catahoula Lake to dam at Archie	2,915,012.94	3,772,321.34	42.53	13.67
081606	Fish Creek - Headwaters to Little River (Scenic)	2,856,381.96	3,776,793.38	42.00	14.65
081607	Trout Creek - Headwaters to Little River (Scenic)	2,881,062.38	3,782,329.12	42.08	15.01
081608	Big Creek - Headwaters to Little River (Scenic)	2,861,893.99	3,766,653.06	42.17	14.12
081609	Hemphill Creek - Headwaters to Catahoula Lake (includes	2,890,829.28	3,784,776.96	42.08	15.13
081610	Old River - Catahoula Lake to Little River	2,904,720.38	3,795,267.10	41.97	15.66
081611	Bayou Funny Louis - Headwaters to Little River	2,883,010.19	3,796,601.61	41.93	15.84

NADP/MDN Station	Station Description	X Coordinate	Y Coordinate	Mean Hg Wet Deposition (ng/m^2/day)	Mean Rainfall Hg Concentration (ng/l)
LA05	Lake Charles	2,848,457.93	3,574,218.81	36.21	15.03
LA10	Chase	2,893,665.09	3,828,497.23	41.89	16.57
LA23	Alexandria	2,921,819.64	3,713,025.66	44.44	10.62
LA28	Hammond	3,121,718.72	3,763,288.33	33.26	14.61

Appendix D-3

Loading Calculations
from Runoff

Subsegment	Subasin Description	Basin	Area (acres)	Runoff Flow Volume (cf/yr)	Rainfall Hg Concentration (ng/l)	Total Hg Load Runoff (kg/yr)
081401	Dugdemona River - Headwaters to Big Creek	Ouachita	437,001	25,661,894,884.70	15.28	11.11
081402	Dugdemona River - From Big Creek to Little River	Ouachita	243,163	17,599,849,446.55	15.40	7.67
081501	Castor Creek - Headwaters to Little River	Ouachita	468,241	29,037,786,983.93	16.24	13.36
081502	Chatham Lake	Ouachita	9,749	583,539,901.66	15.75	0.26
081503	Beaucoup Creek - Headwaters to Castor Creek	Ouachita	45,874	2,679,362,961.57	16.17	1.23
081504	Flat Creek - Headwaters to Castor Creek	Ouachita	103,049	6,230,708,134.40	15.93	2.81
081505	Caney Lake	Ouachita	72,804	4,207,105,308.60	15.80	1.88
081601	Little River - Confluence of Castor Creek and Dugdemona	Ouachita	18,252	1,424,548,226.61	15.42	0.62
081602	Little River - From Bear Creek to Catahoula Lake (Scenic)	Ouachita	182,667	13,160,586,795.46	14.73	5.49
081603	Catahoula Lake	Ouachita	139,657	13,294,639,026.87	13.48	5.07
081605	Little River - From Catahoula Lake to dam at Archie	Ouachita	122,357	8,588,137,147.65	13.67	3.32
081606	Fish Creek - Headwaters to Little River (Scenic)	Ouachita	31,018	1,917,935,482.56	14.65	0.80
081607	Trout Creek - Headwaters to Little River (Scenic)	Ouachita	25,368	1,563,546,382.16	15.01	0.66
081608	Big Creek - Headwaters to Little River (Scenic)	Ouachita	55,834	3,477,238,245.13	14.12	1.39
081609	Hemphill Creek - Headwaters to Catahoula Lake (includes	Ouachita	31,794	1,929,503,400.31	15.13	0.83
081610	Old River - Catahoula Lake to Little River	Ouachita	153,554	10,390,381,278.09	15.66	4.61
081611	Bayou Funny Louis - Headwaters to Little River	Ouachita	93,084	6,047,535,571.02	15.84	2.71
		TOTALS	**2,233,466**	**147,794,299,177.27**		**63.82**

Appendix D-4

Loading Calculations from Soil Erosion

Subsegment	Subasin Description	Basin	Area (acres)	Weighted Average Hg Wet Dep (ng/m^2/day)	Weighted Average Hg Wet Dep (ug/m^2/yr)	Predicted Soil Total Hg Concentration (ng/g) Dry Weight	Hg Load Soil Erosing (ug/ac/yr)	Total Hg Load Soil Erosing (kg/yr)
081401	Dugdemona River - From Big Creek to Little River	Ouachita	437,001	41.55	15.17	64.68	1,454.27	0.64
081402	Dugdemona River - From Big Creek to Little River	Ouachita	243,163	41.75	15.24	64.99	110.46	0.03
081501	Castor Creek - Headwaters to Little River	Ouachita	468,241	41.85	15.27	65.14	110.71	0.05
081502	Chatham Lake	Ouachita	9,749	41.66	15.21	64.85	22,517.76	0.22
081503	Beaucoup Creek - Headwaters to Castor Creek	Ouachita	45,874	41.83	15.27	65.11	11,257.05	0.52
081504	Flat Creek - Headwaters to Castor Creek	Ouachita	103,049	41.79	15.25	65.06	14,141.21	1.46
081505	Caney Lake	Ouachita	72,804	41.71	15.22	64.92	31,485.36	2.29
081601	Little River - Confluence of Castor Creek and Dugdemona	Ouachita	18,252	41.94	15.31	65.28	30,304.80	0.55
081602	Little River - From Bear Creek to Catahoula Lake (Scenic)	Ouachita	182,667	42.06	15.35	65.47	6,169.11	1.13
081603	Catahoula Lake	Ouachita	139,657	42.57	15.54	66.26	7,451.19	1.04
081605	Little River - From Catahoula Lake to dam at Archie	Ouachita	122,357	42.53	15.52	66.20	844.75	0.10
081606	Fish Creek - Headwaters to Little River (Scenic)	Ouachita	31,018	42.00	15.33	65.39	5,963.77	0.18
081607	Trout Creek - Headwaters to Little River (Scenic)	Ouachita	25,368	42.08	15.36	65.50	6,084.54	0.15
081608	Big Creek - Headwaters to Little River (Scenic)	Ouachita	55,834	42.17	15.39	65.65	2,981.39	0.17
081609	Hemphill Creek - Headwaters to Catahoula Lake (includes	Ouachita	31,794	42.08	15.36	65.50	27,595.02	0.88
081610	Old River - Catahoula Lake to Little River	Ouachita	153,554	41.97	15.32	65.33	1,966.12	0.30
081611	Bayou Funny Louis - Headwaters to Little River	Ouachita	93,084	41.93	15.30	65.27	11,471.52	1.07
		TOTALS	**2,233,466**					**10.78**

Appendix D-5

PLOAD Event Mean Concentration (EMC) by Land Use Category

Land Use Code	Land Use Description	TSS EMC (mg/L)
11	RESIDENTIAL	41
12	COMMERCIAL AND SERVICES	55.5
13	INDUSTRIAL	60.5
14	TRANS, COMM, UTIL	73.5
15	INDUST & COMMERC CMPLXS	57
16	MXD URBAN OR BUILT-UP	26
17	OTHER URBAN OR BUILT-UP	26
21	CROPLAND AND PASTURE	107
22	ORCH,GROV,VNYRD,NURS,ORN	107
23	CONFINED FEEDING OPS	132
24	OTHER AGRICULTURAL LAND	132
32	SHRUB & BRUSH RANGELAND	1
41	DECIDUOUS FOREST LAND	45
42	EVERGREEN FOREST LAND	45
43	MIXED FOREST LAND	45
51	STREAMS AND CANALS	26
52	LAKES	19
53	RESERVOIRS	19
61	FORESTED WETLAND	19
62	NONFORESTED WETLAND	19
73		70
74	BARE EXPOSED ROCK	70
75	STRIP MINES	70
76	TRANSITIONAL AREAS	70

Appendix D-6

PLOAD Percent Impervious Cover by Land Use Category

Land Use Code	Land Use Description	Percent Impervious
11	RESIDENTIAL	25
12	COMMERCIAL AND SERVICES	85
13	INDUSTRIAL	70
14	TRANS, COMM, UTIL	65
15	INDUST & COMMERC CMPLXS	75
16	MXD URBAN OR BUILT-UP	60
17	OTHER URBAN OR BUILT-UP	75
21	CROPLAND AND PASTURE	20
22	ORCH,GROV,VNYRD,NURS,ORN	20
23	CONFINED FEEDING OPS	25
24	OTHER AGRICULTURAL LAND	20
32	SHRUB & BRUSH RANGELAND	20
41	DECIDUOUS FOREST LAND	25
42	EVERGREEN FOREST LAND	25
43	MIXED FOREST LAND	25
51	STREAMS AND CANALS	100
52	LAKES	100
53	RESERVOIRS	100
61	FORESTED WETLAND	80
62	NONFORESTED WETLAND	85
73		100
74	BARE EXPOSED ROCK	100
75	STRIP MINES	50
76	TRANSITIONAL AREAS	50

APPENDIX E
RESPONSE TO PUBLIC COMMENTS

Appendix E
USEPA Response to Comments
Louisiana Department of Environmental Quality (LDEQ) Comments dated January 21, 2003

LDEQ comment #1

It is inappropriate to assume that dischargers discharge a pollutant when it has not been included in their permit. USEPA knows that when effluent limits are determined for each facility, they are based on a number of factors, including the type of facility, types of waste-streams and effluent data submitted during the application process.

USEPA Response: Wasteload allocations have been a required element of TMDLs since 1985 (See 40 C.F.R. § 130.2(i)). USEPA regulations since 1989 have made it clear that water quality-based effluent limitations must be consistent with the assumptions of any available wasteload allocation prepared pursuant to USEPA's TMDL regulations. See 40 C.F.R. §122.44(d)(1)(vii)(B); 54 Fed. Reg. 23868- 23879 (June 2, 1989). In addition, the 1987 amendments to the Clean Water Act acknowledge the relationship between TMDLs, wasteload allocations and the ensuing effluent limitations. See CWA section 303(d)(4).

In this TMDL, wasteload allocations have been established that allow dischargers to discharge at loads equivalent to a concentration at or below 12 ng/L. This value was chosen because it is the driver for several permits already in effect in the watershed and because our calculations show that there is sufficient loading capacity in the TMDL to allow for this load. These WLAs are a basic principle of the process used to establish the TMDL. USEPA believes it is reasonable to assume that permitted point sources discharge mercury, even in very small quantities. While it is true that a number of NPDES-permitted sources have not reported mercury in their effluent in past permit applications, USEPA believes this is because the analytical methods in use at the time were not sensitive enough to detect the mercury's presence at these lower concentrations.

Now, however, data gathered with clean sampling procedures show that mercury is present in most wastewater. Moreover, the potential for municipal wastewater treatment facilities to discharge mercury at levels greater than the 12 ng/l target has been demonstrated in POTWs in Arkansas and other US regions. The Arkansas Department of Environmental Quality (ADEQ) conducted a monitoring study of five POTWs in Arkansas using clean sampling procedures and ultra-trace level analyses and found an average concentration of about 15 ng/L in municipal discharges (Alan Price, ADEQ, personal communication 2001). An Association of Metropolitan Sewerage Agencies (AMSA) study of 24 facilities in 6 states showed a range of average effluent concentrations of 3.1 ng/L to 9 ng/L with maximum effluent concentrations ranging from 5 to 29 ng/L (Mercury Source Control and Pollution Prevention Program Evaluation-Final Report, AMSA, 2002). Facilities that discharge to the impaired segment are given a cumulative wasteload allocation. If sufficient data is presented to the State permitting authority, individual waste load allocations may be adjusted to allow sharing of the TMDL wasteload allocation as long as the sum of these wasteload allocations does not exceed that specified in the TMDL and localized water quality limitations are not violated.

LDEQ comment #2

The Permit Division feels it is highly inappropriate to assign any allocations or monitoring requirements to point sources in view of their miniscule contribution to the impairment. This TMDL documents that the dischargers in the watershed contribute less than 1% to the total mercury load in Little River. There are no point source wastewater dischargers that have any potential to cause or contribute to this mercury impairment which is admittedly atmospheric in deposition, thus none should be required to monitor for mercury unless they are already doing so in a valid LPDES permit. Further, to require a source reduction program in the event any discharger "got a mercury hit" in an analysis is a costly, useless exercise. These resources of time and money are desperately needed by small municipalities to maintain and upgrade their systems, both collection and treatment.

USEPA Response: While USEPA acknowledges that the estimated loads from point sources are low, USEPA disagrees with the presumption that there are no point source dischargers that have any potential to cause or contribute to this impairment. Little is known about the potential to discharge mercury for the majority of dischargers in this watershed because effluent sampling for mercury in the past was conducted without the benefit of newer clean techniques. As referenced in previous comments, there is some reason to believe that some dischargers may have mercury in their effluent at levels greater than 12 ng/l, which is the individual WLA for each point source discharger. This TMDL does not call for monitoring beyond what may already be authorized under permit regulations. Rather, a facility is expected only to evaluate its potential to discharge mercury in order to demonstrate that it is discharging at levels consistent with the assumptions of this TMDL, i.e., at or below its 12 ng/l WLA. If a facility can demonstrate by sampling that its effluent is at or below the 12 ng/l WLA or through certification or other mechanism, then no reductions are contemplated by the TMDL. Moreover, LDEQ as the permitting authority has the discretion of defining other steps in the permitting plan process that would decrease the burden on small facilities if they can devise steps to show they are not a potential source of mercury.

USEPA agrees that the point sources are a small component of the overall mercury loading into the waters affected by today's TMDLs. USEPA does not agree, however, that point sources should not be responsible for any of the load reductions necessary for the waters to attain standards. The reductions contemplated by the cumulative wasteload allocation reflect the fact that mercury is a bioaccumulative, persistent pollutant that has been linked to serious health effects. EPA remains concerned about children potentially exposed to mercury in the womb. In a recent publication, "America's Children and the Environment: Measures of Contaminants, Body Burdens and Illnesses" (EPA, 2003) conclude that about 8 percent of women of childbearing age in the United States have concentrations of mercury in their body at levels of potential concern. For these TMDLs, USEPA believes as a matter of policy that point sources that can reduce their mercury discharges in a cost-effective way should do so. The mere fact that air sources are currently the dominant cause of impairment does not excuse point sources from implementing feasible pollution prevention measures to reduce their contribution of mercury, however small, to the environment. Indeed, sources that implement pollutant minimization (PMPs) plans frequently remove from the environment considerably more of the pollutant than can be accomplished through treatment. This is because less of the pollutant is generated in the first place; except when the pollutant can be completely destroyed (e.g., by changing its molecular structure), treatment solutions usually result in simply transferring the pollutant from one medium to another (e.g., from water to the air or land).

USEPA also notes that point source discharges of bioaccumulative chemicals like mercury may have particular local significance, apart from their contribution to the cumulative load. Point source discharges by their nature may create "hot spots" where observed elevated concentrations have potential impact on aquatic life, wildlife, and human health. Consequently, comparing contributions from the air and water sources conceals the real impact of mercury from point source discharges. EPA believes that in many cases elevated receiving water concentrations may be dictated solely by the mercury concentration in the effluent as opposed to the mercury delivered from air deposition. This is supported by field data in other locations and will generally be true when comparing the near-field effects of effluent discharges relative to air sources. Empirical data supports USEPA's research into air deposition of mercury and fish tissue modeling that showed that controls on point sources could factor site-specifically into reducing fish tissue levels of mercury. In short, USEPA believes it is reasonable to expect NPDES permittees to implement feasible and achievable measures to reduce the amount of mercury they discharge into the environment.

USEPA does not believe that these TMDLs place massive cost burdens on NPDES point sources. Point sources represent less than 1% of the load allocations necessary for the waterbodies to attain standards. USEPA anticipates that when reduction efforts are necessary, the point sources will be able to achieve their individual WLAs or, at a minimum, the cumulative WLA for all point sources, through implementation of feasible and achievable mercury minimization measures, identified by the point sources themselves. In addition to reducing direct discharges of mercury to the waters affected by these TMDLs, mercury minimization also can have the additional benefit of significantly reducing the creation of methylmercury and the transfer of mercury to wastewater treatment sludge.

USEPA recognizes that it is possible that reductions in mercury emissions from air sources may, by themselves, eventually result in the attainment of water quality standards for the affected waters. However, while USEPA projects significant reductions from current or proposed MACT regulations, for a number of TMDLs USEPA cannot be certain at this time that all reductions needed to meet the TMDL's load allocations will be achieved. One way that USEPA is accounting for these uncertainties is by assigning cumulative wasteload allocations that assume that mercury dischargers will either maintain their effluent at or below applicable wasteload allocations for mercury or will implement feasible minimization measures (i.e., do the best they can to reduce their loadings of mercury to the affected water). USEPA is also accounting for these uncertainties through its margin of safety. In addition, these measures can conceivably yield reductions beyond those actually contemplated in the cumulative WLAs, thus providing a margin of safety to offset equivalent reductions that ultimately may not be achieved from the air sources.

Under USEPA's regulations, NPDES permits must include conditions as necessary to achieve applicable water quality standards. See 40 C.F.R. § 122.44(d)(1). In order to decide whether such limitations or conditions are necessary, the permitting authority must determine whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream exceedance of the applicable water quality standard. See 40 C.F.R. § 122.44(d)(1)(i). USEPA believes that NPDES discharges of mercury to these waterbodies do have the reasonable potential to cause or contribute to an exceedance of water quality standards. However, if they are regulated at levels that are consistent with the assumptions of the wasteload allocations in these TMDLs, they will not cause or contribute to the exceedance of water quality standards. Therefore, more stringent limitations than those derived from the wasteload allocations should not be necessary to achieve water quality standards.

As presented, the Little River TMDL predicts assimilative capacity after full implementation of MACT controls on a nationwide basis. The TMDL estimates a needed reduction of approximately 33% with MACT controls resulting in a 50% reduction as a National average. If that prediction were accurate for the Little River (such that there would be considerably more reductions achieved than actually needed), there perhaps would be a basis for allowing all point sources to remain at existing effluent quality. However, EPA does not have certainty that "more than enough" reductions will be achieved through MACT controls. The assumed MACT reductions are a National average and may not adequately characterize the reductions that may or may not take place in and around the Little River watershed. This leads to uncertainty about whether or not more than the needed reduction will actually be attained and if sufficient assimilative capacity will be created to all point sources to remain at existing effluent quality. Also contributing to this uncertainty is that fact that the MACT reductions provide an indicator of overall reduction to the watershed and do not account for possible localized effects of effluent containing mercury. Local characteristics such as water velocity, bed substrate, oxygen content and microbial community structure all contribute to methylation potential. Since these characteristics have not been defined for each of the dischargers in the area, there exists the potential that effluent containing mercury may cause localized exceedences of the criteria and therefore, PMPs and/or numeric limits are necessary in order to assure that the discharge does not cause and/or contribute to an exceedance of the applicable water quality standard. In conclusion, due to uncertainty in the TMDL analysis, PMPs and/or numeric limits are necessary to meet the assumptions of the

TMDL and assure compliance with the water quality standards." The concentration-based water quality criterion for mercury explicitly takes into account bioconcentration of grams of mercury in fish tissue, thus reflecting both concentration and mass concerns. While it is possible that individual dischargers implementing mercury minimization measures might exceed the WLA of 12 ng/l on a case-by-case basis, the extra discharges are already reflected in the cumulative wasteload allocations of these TMDLs, which also reflect the numerous other NPDES dischargers that appear to be maintaining mercury discharges below 12 ng/l. This means that the total point source loading, in the aggregate, would be at or below the cumulative WLA.

LDEQ comment #3

It was assumed that a linear relationship exists between the mercury load to the subsegment and the fish tissue mercury concentrations. The relationship between mercury load to a waterbody and the accumulation of mercury in the fish tissue is not thoroughly understood. A TMDL based on this relationship is disputable.

USEPA Response: USEPA concurs with LDEQ that the relationship between mercury loading to a watershed and the accumulation of mercury in fish tissue is complex and highly variable and is influenced by a number of natural processes. This representation of mercury fate establishes a spatially varying relationship between point and atmospheric loadings, total mercury in soil, total mercury in water and sediment, methyl mercury in water and sediment, and mercury in fish tissue. This analysis assumes that reductions in loadings will lead to proportional mercury loading reductions in all media over time. While this seems to be relatively simple it does represent our current knowledge of mercury cycling in the environment.

Studies done around the nation indicate methylation uptake rates of available mercury can vary widely with some studies confirming a linear relationship between loading and bioaccumulation in fish tissue. Recent modeling results from pilot studies in the Everglades (EPA, 2003b) support that for the Everglades there is a linear relationship between mercury deposition and levels of mercury in fish. This relationship of fish mercury levels and deposition is almost 1:1. While it is not appropriate to transfer these results directly to other sites, it does provide support that this assumption is realistic and has been substantiated in at least one other location. USEPA has made commitments to improve the predictability of the models for mercury cycling in wetlands and tributary systems. A comprehensive data collection effort throughout the Little River/Catahoula Lake watershed as well as within appropriate reference watersheds involving water, sediment, and fish sampling in tandem would be necessary to demonstrate more specific methylation rates. However, without additional watershed specific data to demonstrate a substantial decrease in the bioavailability of mercury in water or sediment, USEPA has selected a conservative approach to calculate the estimated loading and necessary TMDL. The conservative assumption that 100% of the mercury loading is bioavailable is an implicit component of the margin of safety, which is a required element of a TMDL.

This analysis assumes that reductions in loadings will lead to proportional mercury loading reductions in all media over time. While the spatial representations and time trends predicted by the model are uncertain, the expected reduction of mercury concentrations in soil, water, sediment, and fish due to reduced loadings is sound. It should be obvious that present concentrations in fish have resulted from loadings averaged over an appropriate time (as affected by transport, transformation, and bioaccumulation processes). Further, if all loadings could be completely eliminated, the mercury concentrations in all media and fish would eventually equilibrate to very low levels, below concentrations of concern relative to human health. We assume that methylation/demethylation rates and food web structure will be unaffected by future mercury load reductions. Therefore, predicted mercury concentrations in all media at a location (given sufficient time to re-equilibrate) will be related to load reductions in a roughly linear manner. This approach used the best technology we have available for developing a TMDL for mercury.

Federal Water Quality Coalition (FWQC) Comments dated January 21, 2003

I. USE OF FISH ADVISORIES AND NARRATIVE STANDARDS

FWQC comment #1

USEPA used a methylmercury fish tissue concentration of 0.5 mg/kg as the endpoint for the TMDL, which is stated to be the State's interpretation of its narrative standard. This number is also the basis for the fish consumption advisory issued by the State. Whether this is considered to be an interpretation of the State's narrative standard, or use of a fish consumption advisory, or both, we are concerned that it is an inappropriate method for calculating a TMDL endpoint, for several reasons. As for fish advisories, these notices are a very imperfect tool for judging whether water quality is truly impaired. They are generally issued by state health departments, without any process for public input, and often without any formal criteria for data quantity, quality or validity. In many cases, the advisory is issued only for informational purposes, to trigger further investigation, or is issued on a cautionary basis, when fish tissue levels of a substance do not yet pose a significant risk but are worth some attention. To utilize the advisory level as a "narrative interpretation" does not make it any more valid as a legal matter. The fish tissue concentration has not been formally adopted into the water quality standards through Louisiana's rulemaking process. Use of this criterion, without formal rulemaking, is legally invalid, because the criterion has not been subjected to public notice and participation that occurs during the rulemaking process.

By using the fish tissue criterion to declare the Little River impaired, USEPA is essentially replacing the state's water quality standard for mercury. Section 303(c) of the Clean Water Act (the "Act") provides a procedure for USEPA to properly revise standards in accordance with the procedures set forth in the Act. When the state's water quality standards were promulgated, USEPA had the opportunity to specify any changes necessary to comply with the Act. Indeed, USEPA retains the ability to revise the standards at any time, if necessary to comply with the Act:

(4) The Administrator shall promptly prepare and publish proposed regulations setting forth a revised or new water quality standard for the navigable waters involved—

(A) if a revised or new water quality standard is submitted by such State under paragraph (3) of this subsection for such waters is determined by the Administrator not to be consistent with the applicable requirements of this chapter, or

(B) in any case where the Administrator determines that a revised or new standard is necessary to meet the requirements of this chapter.

The Administrator shall promulgate any revised or new standard under this paragraph not later than ninety days after he publishes such proposed standards, unless prior to such promulgation, such State has adopted a revised or new water quality standard which the Administrator determines to be in accordance with this chapter.

CWA § 303(c)(4), 33 U.S.C. § 1313(c)(4). If USEPA truly believes that Louisiana's numeric water quality standards are insufficient to meet the requirements of the Act, USEPA can avail itself of this procedure to properly promulgate the necessary standards, rather than circumventing Louisiana's approved water quality standards for mercury.

USEPA Response: USEPA disagrees that its water quality target for this TMDL suffers from legal deficiencies. Louisiana has not adopted a numeric value for protection of human health. They have however, adopted a narrative water quality criterion to protect human health. See Section LAC 33:IX.1113.B.5. This narrative water quality criterion provides: "No substances shall be present in waters of the state or the sediments underlying said waters in quantities that alone or in combination will be toxic to human plant, or animal life or significantly increase health risks due to exposure to the substances or consumption of contaminated fish or aquatic life."

The State of Louisiana, in part, protects from violations of this narrative criterion by issuing fish consumption advisories according to state developed and approved methodologies. The Louisiana Department of Health and Hospitals (LDHH) and LDEQ coordinate in the assessment of data for health risks and jointly issue advisories if warranted. The Louisiana Department of Wildlife and Fisheries and the Louisiana Department of Agriculture and Forestry are also apprised of the situation and allowed to comment. LDHH and LDEQ use a limited meals approach in establishing health advisories. The two lead agencies will consider issuing a health advisory limiting fish consumption for pregnant or breast feeding women and children under seven for locations and species where the average concentration of mercury exceeds 0.5 parts per million (ppm) in fish and shellfish. At average concentrations exceeding 1.0 ppm, the agencies will recommend limited meals or no consumption for pregnant or breast feeding women and children under seven and limited consumption for the general population. In addition, LDHH considers other types of information when making advisory decisions. These considerations include, but are not limited to, information on sensitive subpopulations and local fish consumption practices that can affect exposure, the number of samples within a species, and the size and number of fish collected (LDEQ website http://www.deq.state.la.us/surveillance/mercury/2000report/intro.htm) USEPA believes that it was appropriate and consistent with the State's narrative water quality standards to establish the fish tissue target for this TMDL at the same 0.5 ppm tissue concentration used by the state to issue first stage fish advisories. According to State procedures if average fish tissue levels are reduced below this level no fish consumption advisories are warranted and USEPA would interpret this to mean that the narrative WQS for fish consumption are being supported.

USEPA has determined that fish tissues in the Little River contain levels of mercury from municipal, industrial and other (i.e., air) sources at levels that are harmful to humans who consume fish from the River. Therefore, USEPA has concluded that the Little River exceeds Louisiana's narrative water quality criterion for toxic pollutants. In view of that conclusion, USEPA has the authority to establish a TMDL to address that impairment. Congress did not limit the term "applicable waterquality standards" in CWA section 303(d)(1)(C) to standards based upon numeric criteria, and USEPA's 1985 regulations at 40 C.F.R. § 130.7(b)(3) define "applicable water quality standards" to refer to "those water quality standards established under section 303 of the Act, including . . . narrative criteria. "See also 40 C.F.R. § 130.7(c)(1) ("TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS"). Indeed, the use of narrative water quality criteria has been explicitly recognized by the courts when applying "applicable standards" in the TMDL context, see Dioxin/Organochlorine Center v. Clarke, 57 F.3d 1517, 1521 & n.6, 1524 (9th Cir. 1995), as well as in the NPDES permitting context, See, e.g., American Paper Institute v. USEPA, 996 F.2d 346 (D.C. Cir. 1993). Therefore, USEPA is authorized to apply Louisiana's narrative water quality criterion for toxic pollutants in establishing these TMDLs.

The commenter asserts that USEPA's interpretation of Louisiana's narrative water quality criteria in effect usurps the primary responsibility accorded to the states to develop water quality standards. They maintain that USEPA's interpretation is tantamount to a revision of the state's adopted and approved numeric water quality criterion for mercury, and that this de facto revision is unlawful because USEPA failed to follow the procedures established in Clean Water Act section 303(c) for adoption of federal water quality standards. The commenter concluded that the ensuing water quality target (and the TMDL) is invalid. USEPA disagrees with these comments. First, contrary to the commenter's assertions, USEPA is not developing a federal water quality standard to supersede Louisiana's standard, but rather is interpreting a water quality standard that has been duly adopted by the State and certified by the Attorney General. The state's direction that "No substances shall be present in waters of the state… that alone or in combination… significantly increase health risks due to exposure to the substances or consumption of contaminated fish or aquatic life" signifies the state's clear intent that this criterion be interpreted as necessary in order to be applied in the State's water quality based approach to pollution control (e.g., through the NPDES permitting process, the TMDL program or other applicable state programs). It means that a permit writer or TMDL-developing authority applying the narrative criterion needs to interpret the narrative criterion and thus calculate the amount of a toxic pollutant that may be introduced to the water without producing a toxic effect in humans. That calculated amount thus becomes the target for the permit limit (or in the case of a TMDL, the target for the loading capacity) in fulfillment of the explicit intention of the narrative criterion: to avert toxic effects to humans. Thus, far from usurping the state's responsibility, USEPA's act of interpreting the narrative criterion gives significance to the state's own regulatory structure.

The fact that Louisiana has also adopted a numeric water quality criterion of 12 ng/l for the protection of aquatic life is irrelevant. The Little River is listed as not meeting uses designed to protect human health. Therefore, USEPA properly chose to apply Louisiana's narrative water quality criterion for the protection of human health from the effects of toxics under these facts. USEPA reasonably decided it would not be appropriate to ignore the narrative criteria applicable to human health merely because a less protective numeric criterion for aquatic life exists. The narrative and numeric criteria for mercury are complementary; in the absence of a numeric water quality criterion explicitly calculated to protect human health, it is appropriate to use the narrative criterion when human health is at issue. Again, based on information specific to this waterbody USEPA has determined that sufficient loading capacity exists such that if point sources maintain a concentration of mercury equivalent to the state adopted criterion to protect for aquatic life the human health loading targets for the waterbody will be met.

USEPA further notes that the federal water quality standards regulations at 40 C.F.R. Part 131 requires adoption of water quality criteria that protect designated uses. Such criteria must be based on sound scientific rationale, must contain sufficient parameters to protect the designated use, and may be expressed in either narrative or numeric form. In adopting water quality criteria, States, Territories and authorized Tribes are expected to establish numerical values based on 304(a) criteria, 304(a) criteria modified to reflect site specific conditions, or other scientifically defensible methods, or establish narrative criteria where numerical criteria cannot be determined, or to supplement narrative criteria. See 40 C.F.R. § 131.11. Narrative criteria are descriptions of the conditions of the waterbody necessary to attain and maintain its designated use, while numeric criteria are values expressed as levels, concentrations, toxicity units or other measures that quantitatively define the permissible level of protection. To adequately protect designated uses, USEPA believes water quality standards should include both narrative and numeric water quality criteria. In certain circumstances it is possible that numeric water quality criteria can be met and the designated uses still not be achieved. For example, factors such as food web structure, the concentration of dissolved organic carbon in the ambient water, and accumulations in the sediment may affect uptake of mercury into fish flesh on a site-specific basis. In these circumstances, USEPA recommends States and authorized Tribes translate the applicable narrative criteria on a site-specific basis, or if necessary adopt site-specific numeric criteria, to protect designated uses. However, ultimately, the TMDLs should be established to implement the applicable designated uses and criteria.

Second, as noted above, USEPA's act of interpreting the State's narrative criterion ensures the level of protection established by the State for the Little River through the adoption of the designated use of fishing will be achieved. Accordingly, this is not a situation where USEPA has - or should have - determined that Louisiana's current water quality standards are inconsistent with the Clean Water Act. To the contrary USEPA has already determined that the Louisiana standards met the requirements of the CWA and the implementing federal regulations when approving the narrative criterion providing "No substances shall be present... in quantities that alone or in combination will... significantly increase health risks due to exposure to the substances or consumption of contaminated fish or aquatic life." By using site-specific information, USEPA is interpreting Louisiana's duly adopted narrative criterion in a way that ensures that the designated uses are protected as required by the Clean Water Act. The commenters imply that this situation is similar to one where a state had adopted and USEPA had approved a numeric water quality criterion for the protection of human health that new science and/or data now shows to be unprotective. That is not the case. Rather, USEPA is appropriately turning to the narrative criteria to account for the unique site-specific conditions of the Little River as they affect the methylation and uptake of mercury into the food chain, and ultimately affect human health. Thus, in this case, and based upon site specific data, USEPA properly decided to interpret and apply the narrative criterion.

Third, USEPA's act of interpreting Louisiana's narrative criterion does not abridge public participation or otherwise deviate from the procedures associated with the adoption of water quality standards. As noted above, USEPA is interpreting a criterion that was duly adopted by the state pursuant to section 303(c), which requires public participation. Thus, USEPA is not establishing a federal water quality standard without regard for the requirements of the CWA or the APA; rather, it is interpreting the existing Louisiana standard in order to establish a water quality target for the TMDL. Thus, the public participation requirements and rule making procedures of section 303(c) do not apply. Moreover, USEPA has explicitly sought (and received) public comments regarding its interpretation of the narrative criterion, consistent with 40 C.F.R. §130.7(c)(1)(ii), thereby allowing scientific and policy issues to be aired. During the public comment period on this TMDL, affected dischargers, the general public, state agencies, and other interested parties could and did submit information and comments that they believe should be considered in establishing the water quality target. USEPA has provided a written response to those comments on page 8 of Appendix E. Moreover, the appropriateness of the water quality target based on USEPA's interpretation is subject to judicial review. USEPA notes that the CWA and the implementing water quality standards at 40 CFR 131 do not require that States, Territories and authorized Tribes adopt translator procedures for their narrative criteria. Where adopted into water quality standards, they are subject to USEPA review and approval. When these procedures are not adopted into water quality standards but established as guidance, USEPA considers in reviewing and taking action to determine whether the underlying narrative criteria meet the requirements of the CWA and the implementing federal regulations. Such procedures must, in the final analysis, be scientifically defensible and protect the designated use. Some States, Territories and authorized Tribes adopt into their water quality standards translator procedures by which to derive a quantified numeric interpretation of the narrative criterion. However, others do not, or may choose to establish such procedures as guidance for interpreting the applicable narrative criteria site-specifically. The choice of whether and how to establish translation procedures is left to the prerogative of the State, Territory or authorized Tribe. USEPA acknowledges that such a choice must be implemented consistent with State's governing administrative laws and procedures.

USEPA also recognizes that narrative water quality criteria are not expressed as numbers and thus are not directly amenable to TMDL calculations. However, as expressed in USEPA guidance, a State, Territory, authorized Tribe, or USEPA can quantify narrative criteria for use on regulatory actions. USEPA has also used such an approach in promulgating water quality standards for States, Territories and authorized Tribes. See 40 C.F.R. Part 132, Appendix F, Procedure 3 (referring to "values," which are that rule's equivalent to quantifications of narrative criteria); 60 Fed. Reg. 15366 (March 23, 1995) (Great Lakes Water Quality Initiative); 57 Fed. Reg. 60848 (November 19, 1991) (National Toxics Rule); see also Technical Support Document for Water Quality-based Toxics Control, USEPA/505/2-90/001 (March 1991); Guidance for Water-Quality-based Decisions: The TMDL Process," USEPA 440-4-91-001 (1991).

Fourth, USEPA disagrees with comments asserting that USEPA's interpretation is procedurally flawed because USEPA did not promulgate a mechanism by which to "translate" Louisiana's narrative water quality criterion. USEPA agrees with the commenter that, had Louisiana chosen to establish a specific translator mechanism for its narrative criteria (e.g., in order to bind permit writers or TMDL authorities when interpreting a narrative or to meet the requirements of CWA section 303(c)(2)(B)), it would have needed to do so as part of its water quality standards adoption process. See Water Quality Standards Handbook: Second Edition (1994), at 3-16, 3-22. However, Louisiana has not adopted such a mechanism. Therefore, it was appropriate for USEPA to interpret Louisiana's narrative water quality criterion in the context of this TMDL. Under these circumstances, it would be inappropriate and intrusive for USEPA to promulgate a regulation of general applicability that establishes a translator mechanism for Louisiana's narrative water quality criterion.

Finally USEPA notes that calculating a water quality target based on a state's narrative criterion is analogous to the act of deriving water quality-based permit limits from such criteria. USEPA has promulgated and successfully defended a regulation that describes three different approaches that permitting authorities can employ to interpret a state's narrative water quality criterion. See 40 CFR § 122.44(d)(1)(vi); see also American Paper Institute vs. EPA, 996 F.2d 346 (D.C. Cir. 1996) (upholding regulation as consistent with the purposes of the Clean Water Act). Two approaches are relevant here. One way is using the water quality criterion recommendations published by USEPA under CWA section 304(a). See 40 CFR § 122.44(d)(1)(vi)(B). A second way is to calculate a numeric criterion that the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and fully protect the designated use. See CFR § 122.44(d)(1)(vi)(A). Under this approach, the permitting authority may use a proposed state numeric criterion or an explicit policy or regulation interpreting its narrative water quality criterion supplemented with other relevant information, including predicted local human consumption of aquatic foods, the state's determination of an appropriate risk level, and other site-specific scientific data that may not be included in USEPA's criteria documents. See id; see also 54 Fed Reg. 23,868- 23876 (June 2, 1989. Under this approach, the authority interpreting the state narrative is authorized to employ any information that it believes will produce a limitation that will attain and maintain the water quality criteria and fully protect the designated uses. USEPA has employed the second approach in interpreting Louisiana's narrative water quality criterion, albeit for a slightly different, although related, purpose. Because the wasteload allocations in today's TMDL ultimately will become the basis for NPDES permit limits for certain dischargers, see 40 CFR § 122.44(d)(1)(vii)(B), it is reasonable for USEPA to apply the principles of the permitting regulation in the course of developing the TMDL.

II. REQUIREMENTS FOR POINT SOURCES

FWQC comment #2

In the TMDL, USEPA estimates that 99.5% of the mercury loadings are contributed by air sources. Based on the fish tissue concentrations over the entire watershed and the calculated TMDL endpoint target, USEPA believes that a reduction of 32.43% is needed in fish tissue levels. USEPA estimates that federal and state programs will result in a 50% reduction in air emissions, which the Agency believes is more than sufficient to bring the water to attainment of standards. Therefore, no loading reductions from current levels are needed from point sources. We agree with the Agency that this is the correct result.

Although specific reductions from point sources are not required, the Draft TMDL does state that additional efforts by LDEQ and USEPA may be required to demonstrate that point source discharges are meeting the State water quality standard of 12 ng/l. As for mechanisms that may be used to make that demonstration, the Draft TMDL identifies certification for minor facilities that they do not use mercury, and effluent sampling using Method 1631 for major facilities and for minor facilities that cannot certify. If a facility is found to discharge above the water quality standard, USEPA states that DEQ could require the discharger to implement a mercury minimization plan. We understand the Agency's interest in ensuring that the point sources, which it has determined to be minor contributors, do not increase their discharges to a point where they are no longer minor. However, we do have some concerns and questions about the suggested measures in the Draft TMDL.

USEPA Response: USEPA established this TMDL under the assumption that most wastewater facilities are discharging at or below 12 ng/l. The percent reductions and relative loading levels are predicated on this assumption. As discussed in USEPA's Response to LDEQ Comment #1, this WLA was selected because a number of permits already had water quality-based effluent limitations based on this value (when it was thought that protecting aquatic life would be sufficient to protect human health) and, consequently, control strategies had already started to be developed and implemented. Moreover, there is a reasonable likelihood that controls on air sources of mercury will result in achievement of the load allocation in this TMDL, with the result that there is sufficient loading capacity available to accommodate loads associated with the cumulative 12 ng/l WLA.

As the commenter correctly states, the TMDL contemplates the use of Method 1631 for any analyses conducted to demonstrate compliance with the wasteload allocations in this watershed. This method will allow appropriate detection levels of mercury in water that will allow facilities to establish that they are complaint with the loadings established in the TMDL. Use of other NPDES methods for the analysis of mercury do not allow sufficient sensitivity to demonstrate compliance with the TMDL load allocations.

FWQC comment #3

As to the possible certification requirement for minor facilities that do not use mercury, we support having this option available, so facilities whose discharges would clearly not pose significant mercury concerns are not forced into extensive monitoring regimens in order to show that they do not pose concerns. However, we do not understand why this certification option should be limited to "minor" facilities. A major discharger that does not use mercury is no more likely to pose mercury concerns than a minor discharger that does not use mercury. Also, it is not clear from the Draft TMDL what would be needed in a certification. For example, there are many facilities, including those of Coalition members that may have mercury on-site, in switches or other equipment (that are not likely to lead to presence of mercury in wastewater), but which have made (and continue to make) substantial efforts to reduce the use and presence of mercury at their sites. If these sources are allowed to submit certifications relating to these voluntary mercury reduction programs, it would provide the agency with a basis for concluding that mercury discharges from these facilities will not increase, which addresses the agency's concern as to these minor sources, while also encouraging and rewarding voluntary mercury reduction efforts.

USEPA Response: The WLAs in this TMDL assume that each facility will discharge at or below 12 ng/l. If discharges exceed that concentration, then reductions in mercury loadings may be necessary in order to ensure that the cumulative WLA is not exceeded in the waterbody as a whole or in localized areas. The TMDL identifies a certification as one mechanism that a facility could employ to demonstrate to the permitting authority that mercury in its effluent is at or below 12 ng/l. Language in the TMDL has been modified such that this option is not restricted to minor facilities.

The TMDL leaves to the discretion of the permitting authority the decision how to establish effluent limitations based on the TMDL. EPA expects that that decision would be made by the permitting authority on a case-by-case basis, reflecting the facts as they exist at the time the permit is issued. EPA believes it is important, however, that the TMDL identify mercury minimization plans as one possible basis for an effluent limitation not only because such plans have shown to be effective, but also because EPA wanted to assure the State that a limitation based on mercury minimization would be consistent with the assumptions of the TMDL, if the State chose to base effluent limitations on results of minimization and if they were justified by the facts on a case-by-case basis. Major POTWs and industrial facilities, are required to conduct sampling as par of their permit application process so while a certification mechanism is available to them it will not override their requirements for sampling during permit application. In accordance with 122.21(j)(4)(iv), all POTWS with a design flow rate equal to or greater than one million gallons per day, with an approved pretreatment program, or as required by the Director, shall analyze for the pollutants listed in Appendix J, Table 2 (priority pollutants). Facilities less than one mgd are not required to analyze for these pollutants during the application process.

In accordance with 122.21(g)(7), applicants with processes in one or more primary industry categories must report quantitative data for the applicant's industrial category found in table I of Appendix D, and toxic metals (including total mercury), cyanide, and total phenols found in table III of appendix D. Therefore, based on the application requirements, all industries must monitor once during the life of the permit. (See also 40 CFR 122.44(d)(1)(i)). Therefore, EPA does not believe that they will need to make a separate certification, although nothing in the TMDL prevents this. To the extent that these facilities can show that they have no potential to discharge mercury above 12 ng/l, no further action is contemplated by the TMDL.

FWQC comment #4

As for the possible requirement for minimization plans, we believe that development and implementation of minimization plans should not be mandated as a permit condition for point sources. As an initial matter, we question whether the state has the legal authority to impose such permit conditions. NPDES permitting authority is limited to requiring reductions at the point of discharges rather than in-plant locations. While this requirement may be similar to the Great Lakes Initiative rule for Pollutant Minimization Programs (PMPs), the authority for that requirement is limited to the Great Lakes Basin. Moreover, in the case challenging the GLI rule (AISI v. USEPA, 115 F.3d 979 (D.C. Cir. 1997)), the U.S. Court of Appeals for the D.C. Circuit ruled that USEPA does not have the authority to require reductions at in-plant sources of pollutants, but can only set limits that are to be achieved by the source at the point of eventual discharge to waters of the U.S. Likewise, it is questionable whether a state could have this authority as a state's authority is delegated to it by USEPA. USEPA cannot delegate authority it does not have. Furthermore, any requirement that the source achieve reductions, such as those required by minimization plans, when the TMDL itself will include loading reductions from other sources that will, by themselves, result in attainment of standards, is simply inconsistent with the basic notion of a TMDL. Those reductions are not needed to achieve the TMDL's goal, and therefore have no legal basis within the TMDL process.

USEPA Response: The commenter raises two issues here. First, the commenter asserts that USEPA (and therefore the states) lacks the legal authority to require point sources to implement mercury minimization plans in NPDES permits. Second, the commenter asserts that point sources should not be expected to reduce their discharges of mercury because controls on air sources will be more than sufficient to result in attainment of water quality standards. A response to the first issue is provided below. For a response to the second issue, please see the USEPA response to LDEQ Comment #2 on page 2 of Appendix E.

The commenter characterizes the TMDL as "mandat[ing]" NPDES permit writers to impose, as permit conditions, a requirement that sources develop and implement mercury minimization plans. This statement mischaracterizes the TMDL. The TMDL establishes wasteload allocations for point sources, as it is required to do under USEPA's regulations. The TMDL does not (nor, as a non-regulatory instrument, could it) require the use of mercury minimization plans in NPDES permits. Rather, the TMDL simply identifies mercury minimization plans as a potentially reasonable mechanism that the permit writer could consider when it calculates limitations that are "consistent" with the individual wasteload allocations of 12 ng/l. See 40 C.F.R. § 122.44(d)(1)(vii)(B). The TMDL leaves to the discretion of the permitting authority the decision how to establish effluent limitations based on the TMDL. USEPA expects that that decision would be made on a case-by-case basis, reflecting the facts as they exist at the time the permit is issued. USEPA believes it is important, however, that the TMDL identify mercury minimization plans as one possible basis for an effluent limitation not only because such plans have shown to be effective, but also because USEPA wanted to assure the State that a limitation based on mercury minimization would be consistent with the assumptions of the TMDL, if the State chose to base effluent limitations on results of minimization and if they were justified by the facts on a case-by-case basis.

The commenter asserts that mercury minimization is a form of in-plant water quality-based effluent limitation and therefore is unlawful, citing a decision by the U.S. Court of Appeals for the D.C. Circuit in <u>American Iron & Steel Institute, et al. v. USEPA (AISI)</u>, 115 F.3d 979 (D.C. Cir. 1997). USEPA disagrees that mercury minimization is an in-plant effluent limitation. The TMDL does not contemplate the establishment or enforcement of water quality-based effluent limitations within the facility. Rather, mercury minimization is a tool that USEPA expects dischargers would use to reduce their mercury loadings at the point of discharge to the Little River. As such, it would be the basis for an adjustment to the individual WLA of 12 ng/l that otherwise applies to each mercury discharger. In other words, if a discharger desires a mercury allocation that accommodates mercury loadings above 12 ng/l, the TMDL explicitly assumes that the permit writer can revise the individual WLA accordingly, but only if the sum of all individual WLAs does not exceed the cumulative WLA and if the revised WLA reflects the actual or predicted effects of a facility-designed mercury minimization program. The TMDL assumes that the adjusted WLA will reflect mercury minimization (rather than simply existing effluent quality levels above 12 ng/l) for two reasons. First, as noted elsewhere, mercury bioaccumulates; therefore, there is the potential that mercury introduced to the environment (rather than withheld from the environment by pollution prevention) can lead to environmental harm.

Second, the cumulative WLA is based on the assumption that all discharges will be at or below 12 ng/l or, for those that exceed that level, that there will be sufficient remaining load within the cumulative WLA to accommodate mercury loadings as reduced through mercury minimization. The analysis supporting this TMDL does not support the notion that all point sources of mercury can discharge at existing effluent quality and still, in sum, achieve the cumulative WLA. If a commenter objects to a permit authority considering mercury minimization as the basis for an adjusted WLA, then it is free to request a water quality-based effluent limitation based on the original individual WLA of 12 ng/l.

While it is possible that an adjusted WLA could give rise to a numeric end-of-pipe water quality-based effluent limitation, it is also possible that a permitting authority may determine that it is infeasible to calculate a numeric effluent limitation based on the effects of mercury minimization. In this case, USEPA's regulations at 40 C.F.R. § 122.44(k)(3) authorize the imposition of non-numeric effluent limitations in the form of best management practices, in this case mercury minimization measures.[1] The CWA defines "effluent limitation" broadly, and USEPA's regulations reflect this as well. Each provides that an effluent limitation is "<u>any restriction</u>" imposed by the permitting authority on quantities, discharge rates and concentrations of a pollutant discharged into a water of the United States. CWA § 502(11) (emphasis supplied); 40 C.F.R. § 122.2 (emphasis supplied). Neither definition requires an effluent limitation to be expressed as a numeric limit. The D.C. Circuit observed, "Section 502(11) defines 'effluent limitation' as '<u>any</u> restriction' on the amounts of pollutants, not just a numerical restriction." <u>NRDC v. USEPA</u>, 673 F.2d 400, 403 (D.C. Cir.) (emphasis in original), <u>cert.</u> <u>denied</u> <u>sub</u> <u>nom</u>. <u>Chemical Mfrs. Ass'n v. USEPA</u>, 459 U.S. 879 (1982). Thus, the definition of "effluent limitation" contemplates a range of restrictions that may be used as appropriate.

In this TMDL, the narrative version of the WLA could be expressed essentially as follows: the quantity of mercury loadings that would be present in each point source's effluent after the point source quantifies the mercury in its effluent and implements measures, if appropriate, to minimize the identified loadings. Under the narrative WLA, the permitting authority could establish NDPES permit limitations (in the form of narrative requirements) and conditions that could require the discharger, for example, to develop and implement mercury minimization measures.

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[1] While these WLAs are not, in themselves, enforceable water quality-based effluent limitations, USEPA believes that an analogy to such limits for this purpose is appropriate because of their close relationship. <u>See</u> 40 C.F.R. § 122.44(d)(1)(vii)(B) (requiring the permitting authority to ensure that water quality-based effluent limitations in NPDES permits are consistent with the assumptions and requirements of WLAs established in a TMDL).

If a permit writer were to impose a non-numeric water quality-based effluent limitation in the form of a mercury minimization requirement, it could find authority in 40 C.F.R. § 122.4(k)(3). This is not a situation, as was the case in AISI, supra, where the regulation at issue appeared to require achievement of a numeric water quality-based effluent limitation prior to end-of-pipe treatment. Rather, in this possible situation, there would be no numeric water quality-based effluent limitation because presumably it would be infeasible to calculate one. The non-numeric effluent limitation would function as the restriction on mercury loadings necessary to ensure that the mercury ultimately discharged by the facility, at the end of the pipe, would be at levels consistent with the WLA for that discharge. USEPA disagrees with the commenter that the CWA can be read to prohibit a restriction on effluent unless that restriction can be expressed in numeric terms.

FWQC comment #5

In voicing these concerns, we want to emphasize that we are not saying that point sources, in situations such as those presented by the Draft TMDL, will choose to do nothing. That is far from the case. Many point sources of mercury, including Coalition members, are already taking significant steps, on a voluntary basis, to reduce mercury levels in their discharges. Some municipalities, for example, have been promoting management practices to be followed by dentists and similar sources of mercury inputs to their sewage treatment systems. In many cases, these efforts are being undertaken in active cooperation with the relevant State and local agencies, taking into account relative source contributions, feasibility of reductions, and other relevant factors. Also, there are many watersheds where the point sources are already contributing their fair share, or more, toward funding efforts to evaluate and solve water quality problems. Those efforts will continue to take place, and they should be encouraged. But we do not think that they should be mandated. We would like to work with USEPA to seek out ways to promote these efforts without imposing them as permit requirements.

If USEPA, despite the concerns raised above, insists on providing that minimization plans can be included as requirements in NPDES permits, we believe that several important modifications need to be made in those permit conditions. Dischargers should have control over the development and implementation of their site-specific minimization plans. Basically, the dischargers should identify the sources, assess the possible reduction measures, and report periodically to the State on their progress. It would be extremely burdensome for States to have to approve or disapprove these site-specific plans. State approval/disapproval of every discharger's plan would add unnecessary time to the process, delay implementation of the plans, and place States in a position of second-guessing the discharger on process-related technical judgments. Therefore, States should not approve or disapprove the steps or plans. In addition, States should not impose enforceable limits or implementation requirements based on the plans in NPDES permits.

USEPA Response: The TMDL simply identifies mercury minimization plans as a potentially reasonable mechanism that the permit writer could consider when it calculates limitations that are "consistent" with the individual wasteload allocations of 12 ng/l. See 40 C.F.R. § 122.44(d)(1)(vii)(B). The TMDL leaves to the discretion of the permitting authority the decision of how to establish effluent limitations based on the TMDL, whether they be numeric limits or PMPs EPA believes that the TMDL is not the appropriate mechanism to establish specific requirements of minimization or certification plans. EPA expects that that decision would be made on a case-by-case basis, reflecting the facts as they exist at the time the permit is issued. EPA believes it is important, however, that the TMDL identify mercury minimization plans as one possible basis for an effluent limitation not only because such plans have shown to be effective, but also because EPA wanted to assure the State that a limitation based on mercury minimization would be consistent with the assumptions of the TMDL, if the State chose to base effluent limitations on results of minimization and if they were justified by the facts on a case-by-case basis.

III. OTHER SCIENTIFIC ISSUES

FWQC comment #6

We commend USEPA for recognizing the conservative nature of the assumptions used in developing the Draft TMDL, and deciding as a result not to use an explicit margin of safety in the Draft TMDL. However, there are several assumptions made in the Draft TMDL that we are concerned about, including the following: (1) assuming that 100% of the mercury loadings is available for uptake, bioaccumulation and biomagnification; (2) assuming a linear relationship between mercury loadings and methylmercury levels in fish; and (3) assuming that the soil geology precludes any release of mercury from soils. We are not aware of the technical basis for these assumptions, and the final TMDL should provide an explanation of any basis that exists, particularly since other USEPA and Federal agency documents contradict these assumptions.

USEPA Response: Regarding concerns #1 and #2 in the above paragraph, please refer to USEPA's response to LDEQ's Comment #3 on page 5 of Appendix E. Regarding concern #3 above, USEPA contends that existing soils maps and geologic surveys of the area are valid sources of data to rely on when developing TMDLs. Extensive soils sampling throughout the watershed and contributing watersheds are not considered necessary to determine more exactly if and where sources of mercury may emanate from surface geology.

FWQC Comment #7

Further, USEPA should address several other scientific concerns. First, USEPA needs to consider the effect that damming of the watershed has on the conversion of mercury to methylmercury.

USEPA Response: In Section 5.2, USEPA recognizes that seasonal fluctuations of water levels in Catahoula Lake, which are the result of management operations, may have an effect on methylation rates. For a variety of reasons as outlined in Section 5.2, it is plausible that lowering the Lake level may actually increase the potential for methylation of mercury. However, significant additional site-specific data would be needed to determine specifically if or how the lowering of the Lake level may affect methylation rates of mercury or to determine that 100% of mercury loadings is not bioavailable over time. Given the physical characteristics (shallow and eutrophic) of Catahoula Lake and the significant acreage of wetlands surrounding the eastern portion of the Lake, research indicates that these characteristics promote methylation of mercury. Therefore, USEPA believes that it is an appropriate and valid approach to use a conservative assumption that 100% of mercury loadings are bioavailable. Should the state consider evaluating and/or modifying Lake level management practices the results may have more of a direct bearing on implementation of the TMDL. However, if the study results show a significant difference in methylation rates, the state could consider revising the TMDL at a later date.

FWQC comment #8

Second, rather than calculating fish tissue levels by averaging all of the data from all of the species at each sampling location, USEPA should consider actual consumption rates and trophic levels of the various species tested.

USEPA Response: In calculating fish tissue levels using available, recent fish tissue data USEPA relied on the standard practice of LDHH and LDEQ to use average fish tissue concentrations when comparing data to the State's narrative criteria to the 0.5 ppm tissue concentration used by the state to issue first stage fish advisories [cite document in support of this statement]. While site-specific creel census data would be helpful for understanding the actual human health risk present to the local populations, this type of data would be more applicable for use by human health risk professionals when issuing advisories than for establishing TMDLs. Data on actual consumption rates by species within this watershed were not available to USEPA. However, it is a valid assumption that higher concentrations of mercury will typically occur in the higher trophic level species which are more frequently consumed and in larger quantities. Where even average tissue concentrations are elevated enough to cause a human health concern to the population in general (assuming a consumption rate of 30 grams), it is readily apparent that the narrative water quality criterion to protect human health is not being met. Therefore USEPA used an average concentration of mercury in fish tissue for all species (as opposed to the maximum concentration for any one species) as a reasonable estimate of the overall edible fish tissue concentrations throughout the watershed to determine the percent reduction of mercury required.

FWQC comment #9

Also, USEPA appears to improperly assume an average condition in using Mercury Deposition Network data in determining wet and dry deposition.

USEPA Response: USEPA did not simply average mercury deposition data from the MDN. Instead, USEPA used a distance-weighted average for estimating the mercury deposition in the watersheds using actual MDN data. That is average annual wet deposition rates and rainfall mercury concentrations were calculated from four

Louisiana monitoring stations as distance weighted averages. The weighted averages were calculated based upon the inverse square of the distance from the NADP/MDN station to the center of the airshed. This method for estimating mercury deposition is a conservative approach and USEPA considers this appropriate as another aspect of the implicit margin of safety.

FWQC comment #10

Finally, on page 5-6, in borrowing from a Louisiana document for a synopsis of the nonpoint sources of mercury, USEPA goes beyond a summary of the sources and includes an inaccurate statement: that "power plants generally do not have any type of pollution abatement systems for mercury." Therefore, we recommend that USEPA delete this paragraph.

USEPA Response: USEPA acknowledges this comment and has removed portions of the paragraph noted on page 5-6.